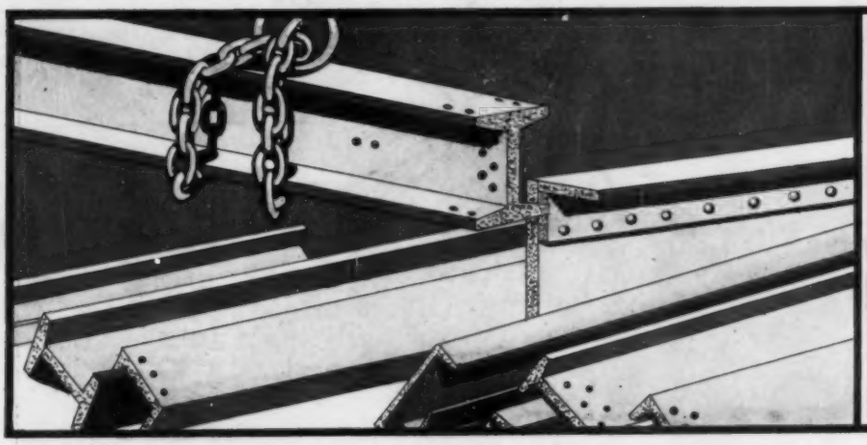


AUTOMATIC SPACING *and* PUNCHING MACHINE *for* STRUCTURAL WORK

By S. A. Hand

This article describes a very novel and ingenious machine for automatically spacing and punching structural steel. All motions are electrically controlled from a central keyboard in about the same manner as musical instruments are played.

THIS machine, which was designed and built under the supervision of Edward V. Wurts, chief engineer, Steel Utilities, Inc., Newark, N. J., automatically spaces and punches variable structural members in both web and flange in one passage through the machine and in any lengths and widths up to the maximum delivered by the rolling mills. Any number of beams varying in size, length, number and arrangement of holes may be punched expeditiously as a like number of beams which are exactly similar in every respect. This will allow material to be punched and shipped as the progress of the work demands instead of having to punch all of one size and pattern while the machine is set, which often means sorting out, shipping part and storing part to be rehandled for later shipment.

One man operates the machine by placing the work on the entering table from a storage bed and discharging it from the delivery table to a loading or runout table.

The labor and cost of making templets and of laying out work is eliminated; detail drawings, tracings and blueprints are not required. The record sheets used in the machine are made up from floor and tier plans, hand sketches and assembly drawings in much less time than is required for making the usual detail sheets. The method of making the record sheet practically excludes error, and with the safety devices prevents punching the work, except as indicated, and insures against all annoyances of lost time and back charges so frequently encountered through incorrectly punched work.

The equipment consists of two punches—a flange punch for punching one or two holes in either or both flanges or a beam or channel, and a web punch for punching from one to four holes in the web. Motor-driven roller tables on entering and delivery sides move the work to and from the punches, which are set tandem. The longitudinal travel of the beam is regulated by a distance control, which automatically advances and stops the beam in correct position relative to either punch. The transverse spacing is accomplished by a transverse control connected to the web punch, which automatically traverses the punch head across the beam, stopping in position for punching.

In operating the machine the record sheet is placed in the keyboard; the beam or other work to be punched is placed on the entering table and the operator closes the starting switch. The beam progresses through the machine, stops in position for punching, is punched, again advanced, stopped and punched, and so on until all the holes in web and flange have been punched and the beam delivered on the loading table. The operator then resets the machine, removes the record sheet and inserts a new one, or the same one again, and when the next beam is placed on the entering table the machine is ready to be again started.

The controls are operated from the keyboard, in which electrical contacts are made through the perforations in the record sheet. The stop motions of the punches are controlled from the record sheet and electrically interlocked with the table motor circuit and both control motor circuits, so that the punch cannot operate until the work is at rest. The spacing distances must have been fully run out before the punches can start, and any failure of the apparatus holds up punching, making it impossible to punch a hole otherwise than is indicated in the record sheet. All punches are provided with gags set from the record sheet.

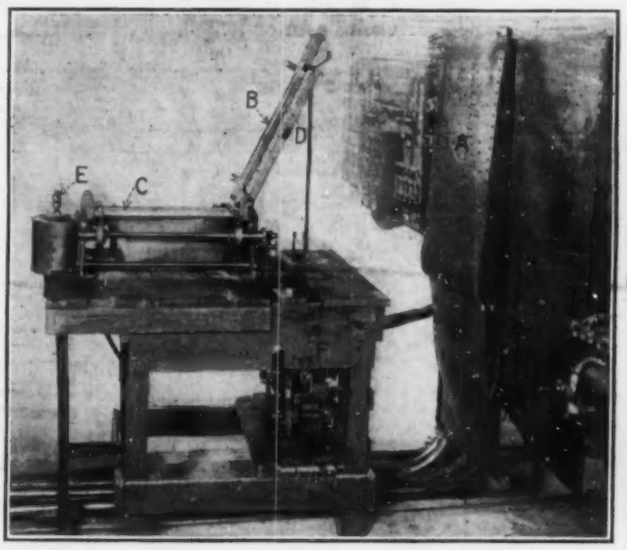


FIG. 1. KEYBOARD AND RECORD SHEETS

When the beam approaches punching position a slow-down device makes electrical contact, slowing down the tables. At slow speed the beam meets a set stop, arresting its travel, the motor circuits are opened, and the punch circuits are closed, starting the punches indicated by the record seat. The return stroke of the punch operates a switch to reset the apparatus, advances the record sheet for a new setting and starts the table motors, when the cycle is repeated. The punch operates only when all three motors have stopped, and the table motors start automatically on the return of the punch.

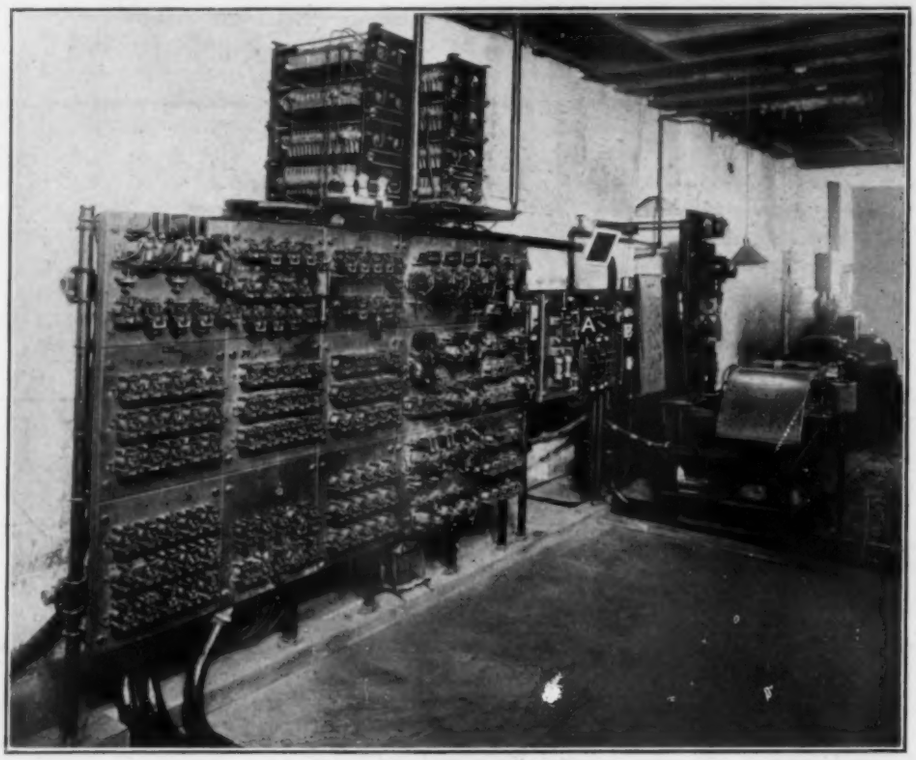


FIG. 2. THE OPERATING SWITCHBOARD

The automatic spacing and punching machine may be considered as made up of seven closely related coöperating parts, which will be taken up briefly in the following order: (1) Keyboard and record sheet; (2) automatic switchboard; (3) feed tables, entering and delivery; (4) longitudinal distance control; (5) transverse distance control; (6) web punch, and (7) flange punch.

The record Sheet *A*, Fig. 1, is a perforated card prepared in advance for each beam or length of work. The perforations denote tens of feet, units of feet, inches and sixteenths of an inch for longitudinal movement, and tens of inches, inches and sixteenths of an inch for transverse movement, web punching, flange punching, punch gags, punch spacing, and repeat and hold for both longitudinal and transverse movements. Electrical contacts are made through the perforations in the sheet. The location of the hole determines the particular contact to be made and therefore the operation to be performed.

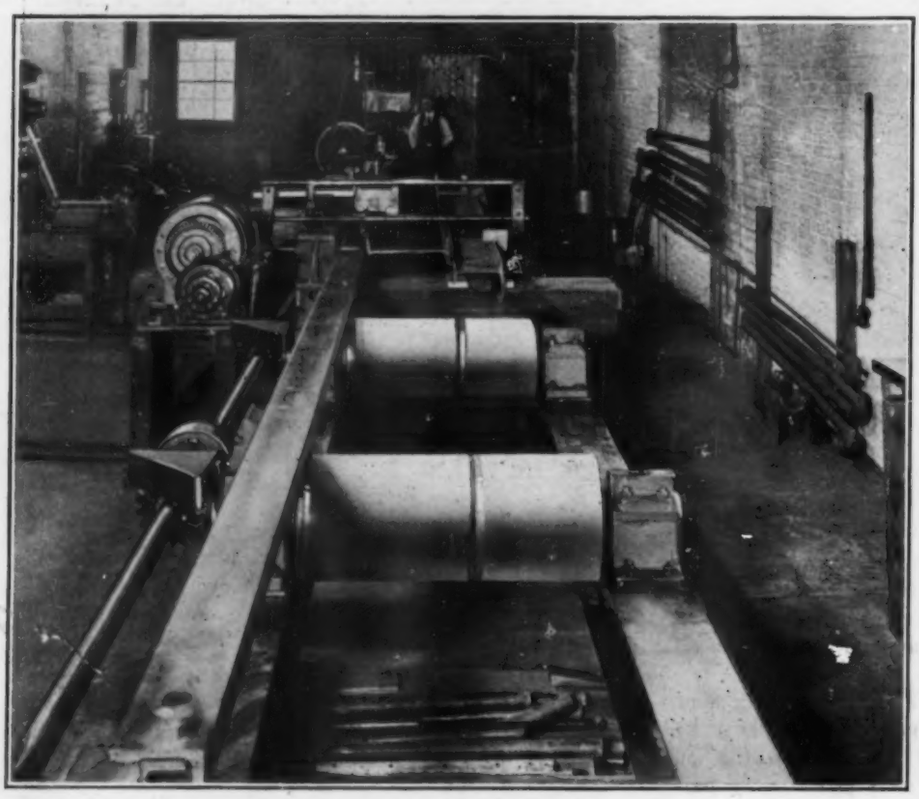


FIG. 3. GENERAL VIEW FROM ONE END

The keyboard shown open for the insertion of the record sheet has two opposed sets of small plungers or contact points which, through the perforations in the record sheet, energize the corresponding relays and contactors on the automatic switchboard to set and control the movements of the machine for punching one hole or group of holes. The upper contacts *B* are connected to a common feed wire carrying 30 volts d.c. The lower contacts *C* connect individually to their respective relays on the switchboard. When the record sheet is inserted the upper keyboard *D* is brought to a horizontal position and latched to the stem of the sole-

noid *E*. The upper keyboard lifts slightly after each punching operation, and the record sheet feeds forward to bring a new set of perforations between the contact points for the next operation. The feed mechanism also opens the circuit while the record sheet is advancing and closes it when the sheet is in position. The keyboard feed is driven from a small motor through a friction drive *F*, but may be driven from the main shaft of the punch.

The automatic switchboard, Fig. 2, mounts the relays and contactors for the control of the machine. For longitudinal distance control, groups of relays for tens of feet and feet energize the selected foot segment, limiting the feet of longitudinal travel. (For instance, if the 12-ft. segment is to be energized for 12 ft. of travel of the work, the 10/10 keyboard contact will close the 10/10 relay, which energizes one side of foot relays 10 to 19 inclusive. The 2-ft. keyboard contact closes relays 2, 12, 22, etc., and of these the 12-ft. relay is the only one both closed and energized. Consequently the 12-ft. segment will be energized.)

Groups of relays for inches and sixteenths of an inch connect to the respective stop-pin solenoids and set the stop pins selected by the record sheet.

Similar groups for the transverse control are for tens of inches, inches and sixteenths of an inch. The first two groups in combination energize the slowdown and stop contacts for the designated inch, and the last group sets the stop pins.

The gags, punch-adjustment and punch-starting relays are all set from the record sheet, but the final closing of the punch-starting circuits is through a relay set from the stop circuit.

Contactors for motor control automatically give fast or slow speed for forward or reverse movement of table, longitudinal distance control, transverse distance control and adjustment motors.

A system of electrical interlocks on contactors holds up punching until both longitudinal and transverse distances have been completed, and arrests punching and stops the machine in the event of failure of any part.

The motor circuits and stop-pin solenoid circuits are all 230 volts d.c. The control circuits for keyboard-operated relays and slow and stop contacts are 30 volts d.c. from a ½-kw., 230- to 30-volt motor-generator set. The various switches shown at *A* are used for hand control and are grouped on a board conveniently placed for the operator. The automatic switchboard may be located in any desired position where it can be properly housed and protected.

The switchboards were designed for standard equipment which was furnished by the General Electric Co., which also supplied the motors.

The feed tables, Fig. 3, on the entering and delivery sides of the punches are motor-driven roller tables of the familiar rolling-mill type and require no detailed description.

The work may be run on the entering table from the end or may be pushed or pulled on at the side in the usual way. A kick-off in the line of the delivery table places the punched work on skids for loading, or transfers it to a runout table to be conveyed to the loading point.

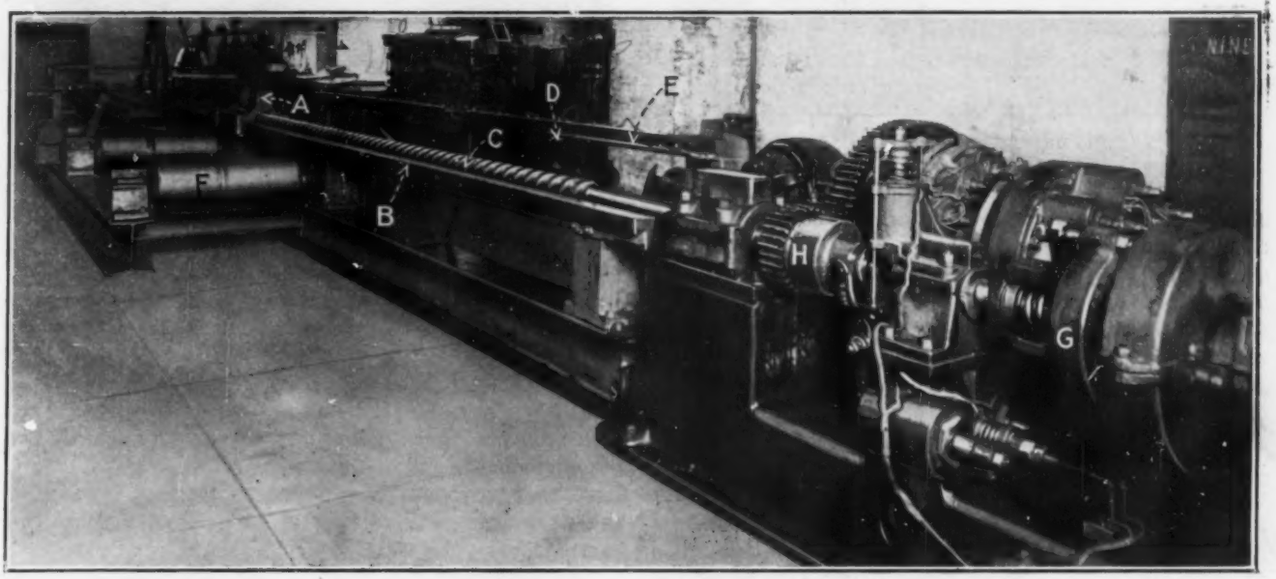


FIG. 4. GENERAL VIEW OF CLUTCH SIDE

The longitudinal distance control, or spacing, mechanism comprises the foot-measuring devices and the mechanism for measuring inches and sixteenths.

The foot-measuring devices consist of a carriage or head *A*, Fig. 4, sliding on fixed guide rails *B* at one side of the delivery table; a heavy screw *C* under the carriage and between the guide rails; a motor drive for the screw and a series of foot segments or electrical contacts *D* placed one foot apart on an insulating bar *E* parallel to and above the guide rails. These foot segments are energized from the record sheet.

The work, driven ahead by the rotation of the table rollers *F*, pushes the carriage in advance along the guide bars. The carriage is provided with a latch which is electrically dropped into engagement with the thread of the screw at any even foot. The dropping of this latch controlled by the record sheet arrests the travel of the carriage at the particular foot desired. The carriage thus forms a stop for the work, permitting it to travel up to the desired foot, as determined by the record sheet.

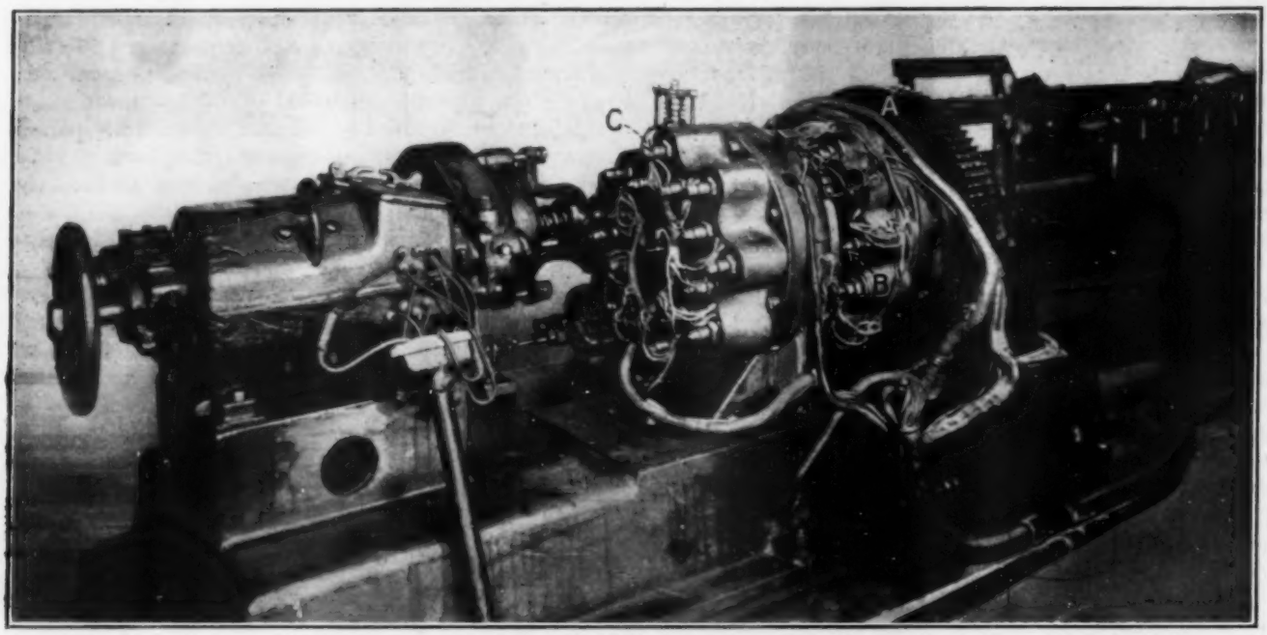


FIG. 5. LONGITUDINAL DISTANCE CONTROL

Two copper shoes are supported on the carriage to slide under the foot segments, one in advance of the other. The carriage also has three trolleys, with wires stretched along the table. The leading shoe and one of the trolleys have the function of slowing down the table motor when the live foot segment is reached. The other shoe and two remaining trolleys make connections which set the latch and close the circuit for the contactors starting the longitudinal control motor.

Inches and sixteenths of an inch are measured by a rotation of the screw, which permits a farther advance of the carriage and work after the latch has been set in engagement with the screw.

The screw is driven by the control motor through a friction clutch *G*. The inch-measuring disk is geared to the screw so that while the screw makes three revolutions per foot of carriage travel the inch disk makes one revolution. The inch disk *A*, Fig. 5, has a slot on one side extending through eleven-twelfths of its circumference, equivalent to 11 in. of carriage travel. Opposite this slot, but supported in the sixteenths disk (which is sleeved on the same shaft with the inch disk), are 12 equally spaced stop pins *B*, any one of which may be projected into the slot to limit the inches of carriage travel. The stop pins are set by solenoids, through relays, from the record sheet, and are spring retracted when the solenoids are deënergized. The set inch stop pin allows a rotation of the screw until the pin engages the end of the slot. The carriage and work have then traveled the designated number of inches, the work being still driven at slow speed against the carriage.

The sixteenths stop pins *C*, identical in construction and operation with the inch pins, are carried in a fixed housing. In the sixteenths disk, opposite the pins, is a series of sixteen slots of different length, one for each

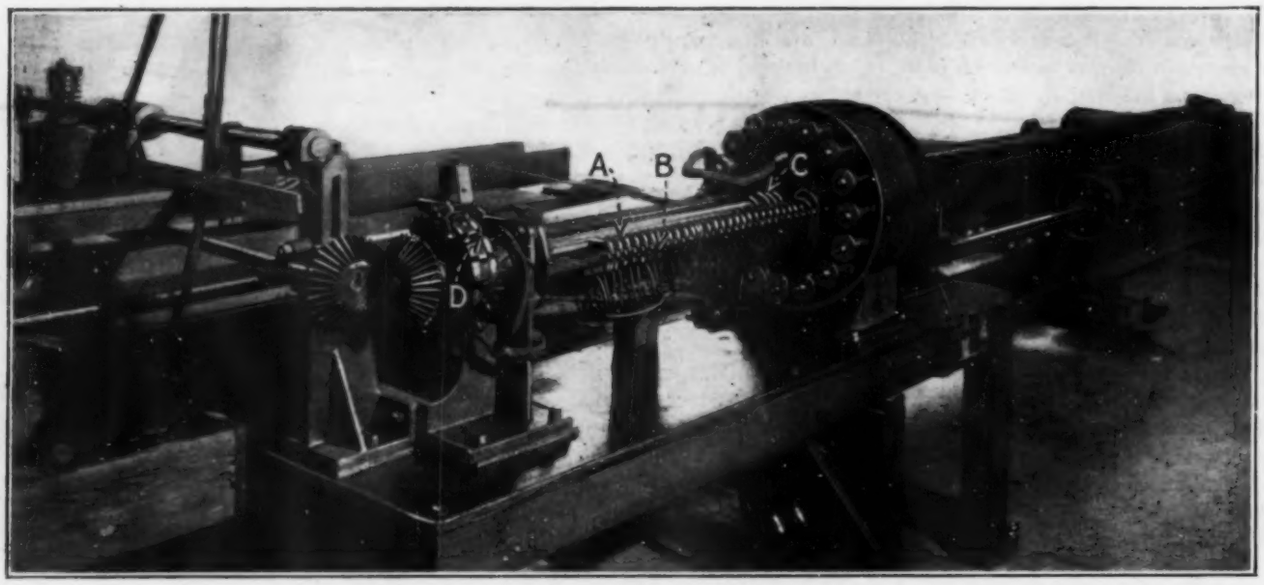


FIG. 6. TRANSVERSE DISTANCE CONTROL

pin, to permit rotation of the sixteenths disk corresponding to the recorded sixteenths of carriage travel. When the set inch pin has engaged the end of the inch slot the sixteenths disk, carrying the inch pins and the sixteenths slots, begins to revolve with the inch disk and the screw, and so continues until finally arrested by the set sixteenths stop pin. This stops the movement of the carriage and the work at the desired foot, inch and sixteenth of an inch of carriage travel, as indicated on the record sheet.

The Friction Drive

The friction drive allows the motor to drift to rest without jar. When the stop pins are released the sixteenths disk is returned to initial position by its counterweight.

A jaw clutch *H*, Fig. 4, connects the screw shaft and the pinion driving the inch gear and disk. When the clutch is open the screw may be rotated independently of the inch disk, and by reversal of the motor the carriage may be returned to its initial position. The motor, except when held in position by a keyboard contact, for a next setting in the same foot. Another keyboard contact holds the mechanism at rest to repeat a longitudinal setting.

If an inch or sixteenths stop pin should fail to engage its slot or the latch fail to engage the screw, or if the latch or stop pin should fail to release, electrical interlocks will prevent the punches from operating, the machine will stop and wait to be reset, and indicating lamps will light up to show the defective circuit.

The transverse distance control governs the travel of the web punch across the work.

The main shaft of the control mechanism *A*, Fig. 6, is geared to top and bottom screws in the punch, which traverse the punch block above and the die block below the work. This shaft is motor driven through a friction drive or slip gear and makes one revolution for each inch of punch travel.

A stop arm at one end of the shaft is stopped at the set limit of travel by one of a set of 16 solenoid-

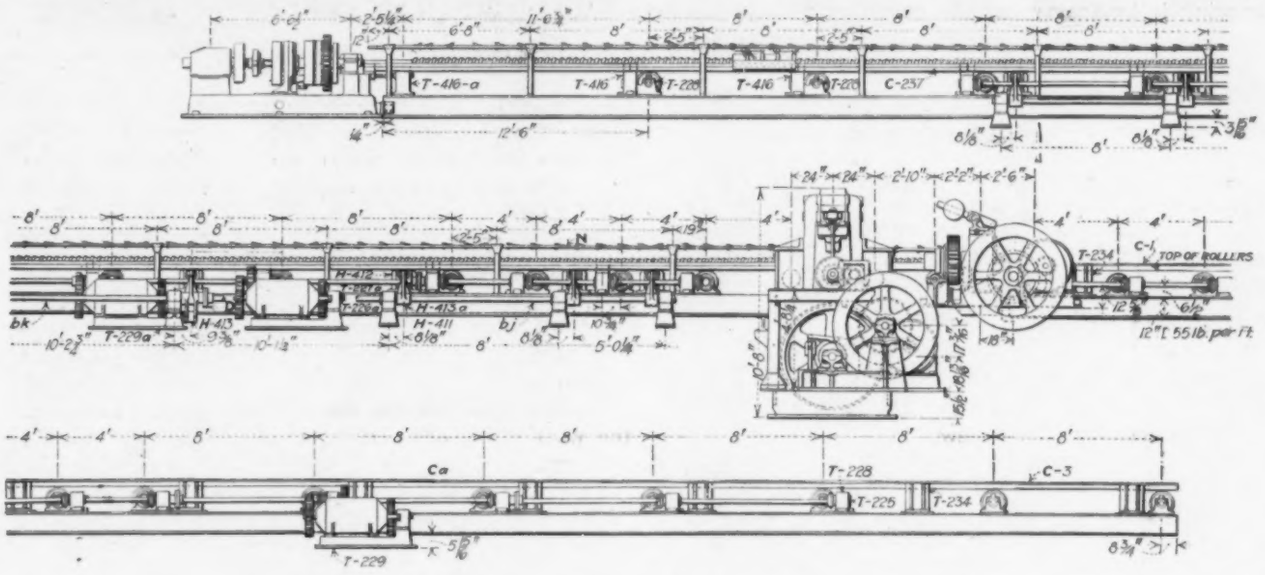


FIG. 7. GENERAL ARRANGEMENT OF DELIVERY AND CONTROL

clutch is controlled by a solenoid operated from the switchboard.

Slow-down contacts for the motors are spaced around the circumference of a fixed disk next to the inch disk, and are operated by a cam on the web of the gear. These contacts, through switchboard connections, slow down and stop the longitudinal control and table motors, so that the machine is at slow speed when the latch and stop pins engage to stop the travel. A stop contact on the sixteenths disk opens as soon as the disk starts to move, and opens the contactors in the motor circuits shutting down both motors. The opening of the motor circuits is retarded by a time-limit relay, so that the sixteenths travel will be fully completed before the contactors drop out.

The sixteenths mechanism returns to zero position after every setting except when held in position by a keyboard contact, when the next setting advances in the same inch of travel.

The inch mechanism returns to zero position after every setting by automatic reversal of the control actuated stop pins projected in the path of the stop arm in its last revolution, which corresponds to the last inch of punch travel. The setting of the stop pin is timed from inch and sixteenths stop contacts, which are energized from the record sheet. When the current on the pin solenoid is released the pin is restored to initial position by its spring.

The Inch Contacts

Two sets of inch contacts—slow down at *B* and stop (not shown)—are mounted in rack bars on both sides of the shaft with a worm splined on the shaft running between them. As the shaft rotates, the worm *C* successively closes the contacts by lifting the contact plungers on the thread of the worm. The slow contacts are given a lead in relation to the stop contacts, so that for any inch the slow contact will be closed first, and the last inch or more of travel will be at slow speed.

The sixteenths contacts *D* are spaced around the shaft at the end opposite the stop arm. A cam on the shaft closes the contacts in turn. The cam is set

with lead to close the contact and set the stop pin in the final inch of travel of the punch or last revolution of the stop arm. The friction drive protects the motor from shock. Limit switches prevent overtravel of the punch in either direction, while interlocks in the longitudinal control prevent punching except when both distances have been correctly spaced.

The mechanism automatically returns to zero position after each setting unless prevented by a keyboard contact for advance to a higher setting. For a lower setting the machine returns below the indicated setting, reverses and comes up to the setting, preventing any inaccuracy from lost motion in the parts. Another keyboard contact is provided to hold the transverse mechanism in position. When the final setting is completed the punch operates and the machine returns to the starting point and stops.

All distances are measured in sixteenths of an inch. Longitudinal distances are measured always from the leading end of the work and are obtained from forward travel of the work on the feed table. Transverse spacing is by traversing the punch or punches across the work, and all measurements are from the right-hand or guided edge of the work. This prevents any cumulative error through a number of consecutive spacings.

The Web Punch

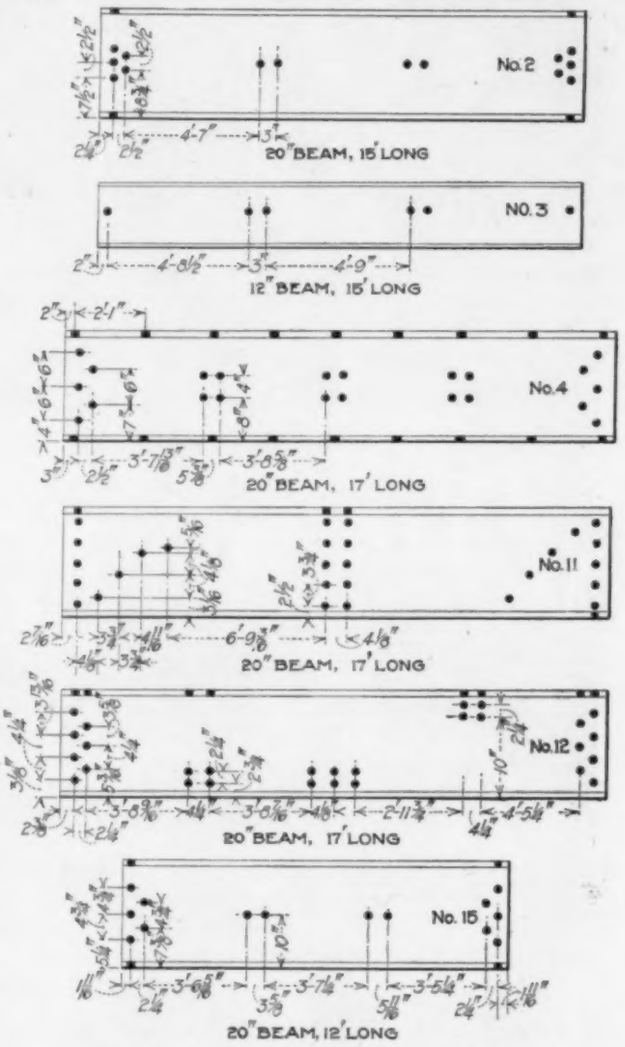
The web punch is a heavy, double-frame punch of special design, motor driven, with a stop-motion clutch electrically controlled from the record sheet. When the spacing movement is completed the punch starts, and, after punching, again starts the spacing apparatus for the next hole or group of holes. It will punch up to four 1-in. holes in 1-in. material.

The top head is provided with two pairs of punch blocks, and the bottom head carries corresponding die blocks. The punches and dies in each pair are set on fixed centers lengthwise of the work. The distance between the pairs of punches and dies is adjustable and controlled from the record sheet. This adjustment is similar to the distance controls described. The two pairs of punches are also moved as a unit, as described in the transverse control. The punches are made selective by gags set from the record sheet.

Both upper and lower heads are driven from the main shaft. The lower head is carried on eccentrics on the shaft, which in turn is carried in bearings suspended from the top head. The top head and shaft are counterweighted in top position. When the stop-motion clutch engages, and the rotation of the main shaft begins, the upper head descends until the punches rest on the work. At this point the lower head rises until the dies seat on the under side of the work, when the upper head again takes up the movement and forces the punches through the work. The return half of the shaft revolution restores the parts to the initial position. This floating movement allows punching of work at a variable elevation above the feed table, a condition encountered when beams of various widths of flange are carried on a fixed table level.

The flange punch is a heavy horizontal power punch specially designed to coöperate with the feed tables and spacing mechanisms. It is motor driven and provided with an electrically controlled stop motion similar to that on the web punch. The machine will punch up to 2½-in. holes in either or both flanges of a beam, or one 1-in. hole in either or both flanges of a channel. Gags for the punches are set from the record sheet. The machine is set by hand or power for the size of the beam.

When the clutch is engaged to start the punch the die blocks are first brought firmly up against the inside



Output Per Hour of Multiple-Punch Machine

Beam No.	Spacings	Holes	Beams	Ft. of Beam
1 (Fig. 11.)	246	656	41	697
2	430	946	43	645
3	204	306	51	765
4	396	880	22	374
11	528	792	22	374
12	598	1144	26	442
15	408	748	34	408
Average	401	782	34	529

FIG. 8. SOME OF THE BEAMS HANDLED

of the flanges and then the punches are driven through, punching both flanges at the same time.

The flange punch coöperates with the spacing mechanism in the same manner as described for the web punch. Web punching or flange punching, or both, takes place, as determined by the record sheet.

The spacing apparatus, or longitudinal and transverse distance controls, with the keyboard and automatic switchboard, has been operated during the past two years by Steel Utilities, Inc., of 425 Kinney Building, Newark, N. J., demonstrating the speed and accuracy of the spacing and the reliability of the machine.

Dummy punches for the web and flange, energized from the record sheet, marked the location of holes in the flange and web of the beam, and were timed to follow the completion of the spacing movement.

The feed tables and longitudinal distance-control handle lengths up to 20 ft. of any section and weight. The transverse control has a range of 30 inches.

The arrangement shown in Fig. 7 provides for a

Fig. 8 shows some of the beams handled, and the table gives data obtained from running each record sheet for several hours continuously, showing a rate of 782 dummy-punched holes per hour. The same work handled under the usual conditions would require a force of about 12 men. A small shop said recently that it could lay out and punch this class of work at the rate of 600 holes in eight hours, while one of

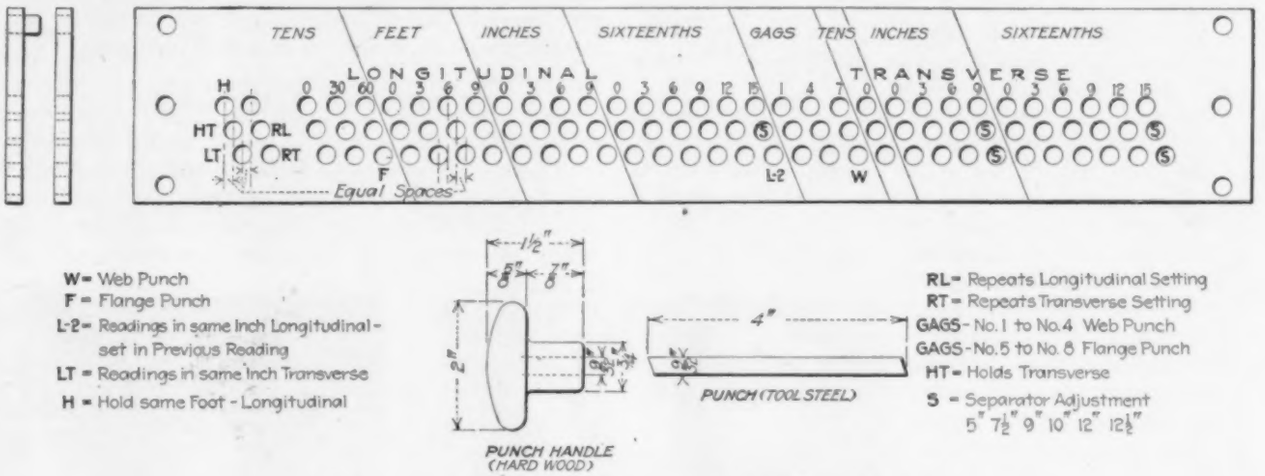


FIG. 9. GUIDE PLATE FOR PUNCHING RECORD SHEETS

length of work of 70 ft., and shows the web and flange punches in tandem. The machine for plate work will have somewhat less longitudinal range and up to 12 ft. of transverse movement, and the flange punch will be omitted.

The following results are from a recent run of the machine: Duration of run, 8 hours; number of beams handled, 151; lineal feet of beam handled, 2471; number of spacings made, 3070; number of holes dummy

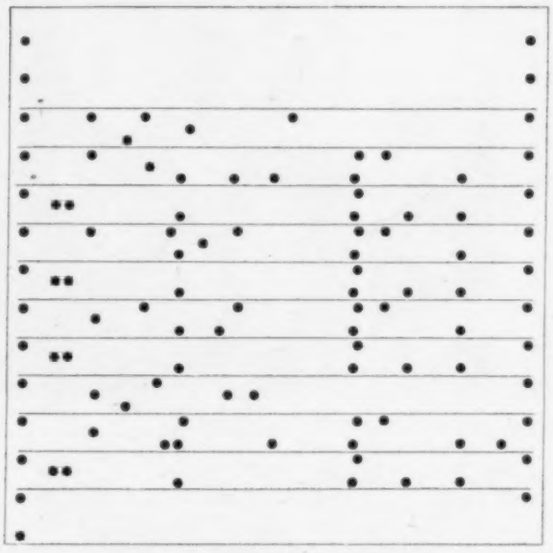


FIG. 10. RECORD SHEET

punched, 5073. Thirteen record sheets were used in rotation for beams from 12 to 17 ft. long, with an average length of 16 ft. 4 in. Longitudinal spacing varied from 15 ft. to $\frac{1}{16}$ in., with an average of 9½ in. The transverse spacings were from 15 in. to $\frac{1}{16}$ in., with an average of 3 in. One man operated the machine.

the large shops gave for multiple work on gang punches the rate of 3000 holes a day. The latter figure does not include the time for setting up the machine.

In the machine described, the rate of 6200 holes per eight-hour shift will be made on either multiple or miscellaneous work, and with a large reduction in labor.

The uniform accuracy of the work will effect a further saving of labor in assembling by eliminating the usual drifting and reaming required to match faulty work. Other advantages obtained are:

Substitution of the perforated record sheet for the usual detail drawings and blueprints.

Freedom from error due to the method of making the record sheet.

FIG. 11. BEAM AUTOMATICALLY PUNCHED

Automatic spacing superseding laying-out work by templet or by hand, with consequent increase in accuracy.

Rapid automatic punching, cutting out labor at the punches and increasing the output.

One passage through the machine for both web and flange punching.

No time required in setting up the machine to suit the work.

Work may be punched and shipped as the progress of the job demands, avoiding extra handling, sorting and storage.

Practical elimination of controversies and back charges and delays in the field due to faulty shop work.

Fig. 9 shows the plate for guiding the punch in

punching the record sheet, while Fig. 10 represents the record sheet, and Fig. 11 is an outline drawing of a beam automatically punched with the punches and spacing mechanism controlled by the record sheet, Fig. 10.

Standard Uniform for Women Workers

The illustrations show the uniform which has been introduced at the Frankford Arsenal for women workers in all processes which might in any way be called hazardous. They show a woman munition worker on a light drilling-machine operation.

The uniforms are made of khaki and have special safety features. There are no openings into which dust of any kind may gather. The pocket on the front is closed at the top and will be used as a place for wearing the insignia of the worker. There is also a large pocket with a long flap which buttons down tightly, allowing the worker to carry her purse, handkerchief and other small belongings in a safe place.

There are no loose ends to this costume. The belt of the waist buttons over the bloomers and gives additional protection from the possibility of inflammable dust lodging in the folds of the cloth. The collar of the blouse can be buttoned tightly around the neck, or can be worn open at the throat if preferred. The cuff of the bloomer has two buttons, allowing for adjustment so as to fit neatly around the ankle.

The cap is made of a lighter weight material than the blouse and bloomers, but is of the same color. The lighter weight prevents overheating of the scalp and at the same time protects the head from dust and prevents the hair catching in belts or in the machinery. The cap has no elastic or tight band, but is so made as to be easily adjusted to any size or shape of head. It is made after the style of the official aviation cap and is worn with enthusiasm because of its general attractiveness and neat appearance.

FIGS. 1 AND 2. TWO VIEWS OF SHOP UNIFORM

Arrangements are being made to have a distinctive insignia of cloth with the letters embroidered on it for women workers in order to identify the wearer as being connected with the Government service. Such an insignia was requested by a committee of the girl workers, who made the original design for the uniform and who selected the style of garment to be worn at the Frankford Arsenal.

It has been the aim of the women's branch of the Industrial Service Section of the Ordnance Department, of which Mrs. Clara M. Tead is supervisor, to secure some kind of shop clothes for women workers in munition plants which will be equally satisfactory for machine work and for work with inflammable powder. The second specification of equal importance is the necessity of having a uniform which the girls and women will wear with enthusiasm. This seems to have been accomplished by having the women workers represented on a committee which took an active part in designing the uniform and in making the final selection. It seems to be very sensible and to combine practical usefulness with attractiveness in a very satisfactory manner.

Shortage of Skilled Labor

Detroit, in common with other industrial centers with large war orders, is facing a serious shortage of skilled labor. This shortage is now in the neighborhood of 20,000; within a few weeks it will be 33,000, due to the opening of large munition plants. Production has been seriously handicapped and some of the largest factories of the city have been forced to curtail their output. Out of a total of 260,000 industrial employees in Detroit 176,000, or 68 per cent., are engaged in the metal trades. They are divided as follows: Automobiles and accessories (now largely engaged in munition work), 103,000; brass and bronze products, 20,500; copper, tin and sheet iron, 6100; foundry and machine shop, 35,000; stoves and furnaces, 4800; iron and steel rolling mills, etc., 2500; tools and machinery not otherwise specified, 1000; adding machines, 3100.

Changes in American Machine-Tool Exports

By L. W. SCHMIDT

This article points out to the American exporter a number of changes which have taken place in the industrial condition of our allies, which must be taken into account in planning after-war business.

THE figures of the Department of Commerce covering the exports of American machine tools during the first nine months of the current fiscal year should interest the student of our foreign commerce. At present we are $19,000,000 behind the export values of the corresponding period last year, though this decline is made up nearly entirely by smaller orders from our allies. Russia shows the biggest drop, from more than $14,000,000 to $2,000,000. This loss can be explained by the fact that Russia has dropped out of the war and that it has not recovered enough to be able to buy again. Besides Russia has never been a very big buyer of American-made machine tools, although there is promise that it will be in the future.

More significant at present, however, is the decline in orders from Italy and France. The first-named country, which during the period in review had bought machine tools in this country amounting to $6,228,726, has so far ordered during this year only $4,034,572; France has taken $3,000,000 less American machine tools than during the last year. The only European country which has bought more machine tools of the United States is England, their value being $12,639,699, or $355,452 more than during the last year, which, however, is a decline when compared to 1915. On the other hand France and Italy are buying more American machine tools than they did in 1915.

Changes in Buying Policy of Our Allies

This condition doubtless needs to be explained. England, France and Italy are industrially the strongest of the Allies in Europe. Their industrial equipment, however, was lagging behind when the war broke out, and the most essential part of their machine-tool equipment had to be provided immediately in great quantities. The United States was the natural market, and all three countries therefore considered it more advantageous to order machines here. This has been the policy of Italy and France; England has been constructing a part of her machine-tool equipment at home. Nevertheless that country has made very extensive purchases in America.

To tune up a country for the business of war takes time, especially if it be a country like England which has never had what may be called a war industry. France, which was probably better equipped, had the misfortune of losing a large part of her industry by the German occupation. So the two strongest powers had to go through an extended period of fitting and now it appears that all have reached the highest pitch of industrial efficiency. We know that while our European allies have been asking principally for war materials they are now laying less stress on this assistance; in fact the English and French industries are now quite capable of holding their own against the German war industry.

War supplies, at least those related to the iron industry, are turned out very rapidly and apparently are sufficiently large to allow of a reserve. Consequently it may be assumed that France and England have reached a stable point in their war-material production and are not pressed for further expansion. What they need of machinery is not for expansion but for upkeep, and this assumption is supported by the fact that there has been of late an increased demand for steel plates by France, amounting to four times what it was last year.

Consul Percival Gassett of Leeds, England, reports that one hardware dealer in Leeds bought from the United States 10,000 tons of gas and steam piping, 1000 tons of wire and 5000 tons of wire nails for which was paid f.o.b. New York, $1,600,000 the freight on which amounted to $500,000.

A Census of Unused Machinery

From reports from United States consuls in Italy it appears that Italy intends to make a more thorough use of its present machine resources than in the past. A census of unused machinery has been ordered which will show what machines will be available for the national industry and where they can be found. These machines most likely will be transferred to localities where they can be best used, thus curtailing the demand for new machines. This will act on the Italian importation of machines of all descriptions; in fact it has already done so, as may be seen from the declining American shipments. Another explanation for the decrease in orders for machine tools from Italy may be found in the standardization of manufacturing methods all over the country, which has now reached a certain state of completeness and therefore ends the need for additional machines. The metallurgical and mechanical industries are filling almost exclusively war orders.

This relieves our own machine-tool industry of the necessity of building large surplus supplies for our European allies and has resulted in setting free American energy for use in America where it is more urgently needed. Our machine-tool manufacturers can now supply comfortably our own manufacturers.

Japan Increases Machine-Tool Orders in U. S. A.

Two items in the figures published by the Department of Commerce demand some reflection. The first is the increase in the exports of machine tools to Japan, which have nearly doubled since last year, and which during the first nine months of the current fiscal year were valued at $1,625,000. Japan has experienced exceptional industrial activity since the outbreak of the war, and recently attention was drawn in *Commerce Reports* to the rapid output of new tonnage in that country. There were 332,617 tons of new shipping constructed in Japanese yards during 1917, and as much is expected this year. Japan has had apparently large orders for machinery and other shop material from China.

Shanghai and Hongkong machinery manufacturers have become very important to the Chinese machinery users and general machine shops, as it is extremely difficult to obtain new machines from Europe and America. These machines are not of the complicated kind, though what can be done in this direction was shown when practically all of the machine equipment of a 10,000-ton steamship launched recently in Hongkong was made locally.

American machines are much in demand in China, and Consul General George E. Anderson writes from Hongkong that among the new factories equipped with American machines are a tannery and a biscuit factory. Knitting and woodworking machinery and machine tools are in demand, but high prices and difficulties in shipment have held down the activity in that market.

Progress Made in Many Countries

The other item demanding attention is that referring to "other" countries. The value of our machine-tool exports to countries classified as "others" has grown from $1,752,157 during the first nine months of the fiscal year 1916 to $3,810,642 during the same period of 1917 and $4,898,983 during the current year. Generally speaking, it is one of the most gratifying symptoms of our foreign trade in machine tools during the war. As it is, we have to look to these countries for any future increase in our machine-tool exports after the war. European markets will not continue to buy as they have done during the war, nor will the yearly progress in orders be very fast during the first years after the war when ordinary peace requirements have been filled. So the smaller ungrouped countries will bring that new progress of trade which we expect to come to the machine-tool builder of this country after the war. Seeing that we have been able to increase our exports to the smaller machine-tool buying countries at the rate we have done, the promise for the future seems to be exceptionally good.

The United States foreign-commerce experts and consuls are now laying the foundation for this new field of expansion, and our machine-tool exporters will do well to pay attention to what they report.

Consul Wallace J. Young, for instance, writes from Göteborg, Sweden, about the extension of a plant making cogwheels in that city. This plant was erected a year ago and is ready to add a new building to accommodate about 500 workmen. In Norway shipbuilding will be very active in future. One well-known yard, the Stavanger Stoberi og Dok, is taking up the manufacture of standard ships. The whole district, which by the way has just now received additional power resources, promises to be a very good market for machine tools.

This item of "other" countries includes also South America. The importance of this trade to our machine-tool makers need not be enlarged upon, and while not large in former years it is bound to grow, and we should not forget that in export trade every bit counts. A machine-tool manufacturer who desires a large business should be obliging to small customers. If the South American countries want our machine tools, it should be as easy for them to obtain them as it is for the big European countries. Argentine, Brazil and Chile have been considerable buyers of American machine tools. They are beginning to buy again, and their custom should become very valuable with the increasing importance of their own industries. In Argentine there are 1177 shops of various sizes doing metal work, of which doubtless many are engaged in repair work only. Vice Consul Richmond P. Momsen writes from Rio de Janeiro that the government has issued a decree providing for the support of the Brazilian steel industry. This should soon lead to an increased activity in the Brazilian steel industry, accompanied by a corresponding activity in shop construction, repair work and the machinery industry in general. American machinery imports have largely benefited in the Venezuela trade because there has been hardly any competition since the outbreak of the war. During 1917 there were imported into Venezuela machinery valued at $263,000 and parts at $55,000.

Attention should also be paid to India, where in recent years many additions to machine shops have been made. This condition was forced by the fact that little repair work could be done in England and consequently had to be done in the country.

Canada Takes Less American Machine Tools

Considering the great industrial activity in Canada it is surprising that orders for machine tools have declined during the fiscal year. While during the first nine months of the fiscal year of 1916 American machine tools amounting to $4,453,568 in value were exported to Canada and during the same period of 1917 $6,156,370, the value of the machine tools sent during the present year so far has reached only $2,745,431. Unfortunately it is impossible to find out at present whether Canada has been buying machine tools from other than American sources during last year, as the Canadian government has not published any statistics for the year 1917.

The opinion of men who have studied Canadian machinery conditions during the last year seems to be that Canada has imported only a few machine tools not of American manufacture, and that the $2,700,000 representing the value of that import constitute practically all foreign machine tools bought by Canada the last nine months. It also bears out the fact that the countries now at war have reached the limit of industrial expansion necessary for the purpose of the war, and that for this reason no further increases in orders for machine tools can be expected.

Canada is, however, a good example as to the influence of the war on industrial activity. According to figures compiled by the *Monetary Times* and reproduced in a report of Consul General John G. Foster in Ottawa, Canada's war orders from the outbreak of the war to 1917 totaled $1,812,000,000. Two hundred and twenty-five thousand men were engaged in the Canadian munition industry alone, and $46,730,000 was the value of orders for the ship yards. Many new industries have developed in Canada, among them being the refining of copper and spelter. A great number of plants for making ammunition and building airplanes have been erected and the Imperial Munition Board has established an electric steel plant to utilize scrap metal. The builders of railroad material have received very large orders. As a result of this the field of machinery consumption has

widened in Canada. Even if the demand for American machine tools should be lower now than it has been during the first years of the war it can be expected that our northern neighbor will be a larger consumer of machine tools after the war than it was before.

The war has set moving many new economic forces in the world, which in one way or the other will reflect on the industrial activity of all countries. No extensive industrial activity can exist that does not bring with it a demand for tools. The building of automobiles, of railroads, the construction of factory buildings, the making of knitting machines and their needles, all require the employment of automatic machine tools, and every new factory added to the number of those existing means new orders for the machine-tool industry.

What we must do at present is to keep a careful lookout for these developments. Our export statistics already begin to indicate changes in the direction of the demand for machine tools. Every such change has a cause. The machine-tool builder who is first to locate the cause will also be the first to make use of the new market.

War As a Test of Efficiency

By EDWARD H. HURLEY

Chairman of the United States Shipping Board, Before the National Coal Association, Philadelphia, May 28, 1918

IN THE past the American people have not appreciated coal. Neither the public nor you mining men realized the importance of your position in the nation's needs until last winter, and it has been distinctly helpful to have your importance brought home to you and the public. It has broadened your vision of your position in this country's affairs. It has made you feel the responsibility which each of us must personally feel and accept today.

The experience of the past winter also taught the American people more about this industry than they ever knew before. They have a better understanding of the magnitude of undertaking to coal the United States of America. They know more about the difficulties which you men have had to overcome; but at the same time they have acquired a sharp conception of the fundamental importance of all you men and your work, and for that reason they expect you to do your part in carrying on the war program of this nation. That expectation is more earnest since they understand more fully how vital your part really is.

It was absolutely necessary for the Government to step in and take over control of the coal industry. No man can say how long the Government may exercise its supervising control over the production and distribution of coal, but most all business men now appreciate that the Government is going to take an important part in our affairs hereafter. Therefore we do not face the question of the old methods of doing business, but we must all adapt ourselves to the new conditions that now prevail. We are all supremely interested in getting the best results. In my opinion the only way to accomplish the best results is by coöperating with the Government in an intelligent and sympathetic way. Your association, from its inception, has taken precisely that position.

Preparing for the Future

Whatever the length of the war we are preparing in good measure for present and future. We are doing it in a large way worthy of our great country. Not only for the war, but for the times after the war when we shall be called upon to do the immense work of rehabilitating devasted Europe. Other countries needed our coal before the war—nearly 21,000,000 tons of it annually. They have needed more of it since the war began. They will need it after the war. And we will not only have the vessels and other vehicles to carry on our inland and coast waters and on our railroads the millions of tons of coal used yearly in this country, but we shall have a great merchant marine of our own to carry coal and all other American products to other countries.

It seems to me that one of the most important things your association can do is to begin active preparations now to increase your efficiency so as to maintain the production of coal at the highest possible level. You have taken the first step in this direction by working out a uniform system of cost accounting and by organizing a cost-accounting department to assist mine operators to put their business on a sound basis. In every trade association the strong must help the weak, and in most cases the weak are those who know the least about their own business. Accordingly the first move to strengthen your industry is to teach those weak producers the facts about their own conditions. Coal should be mined at a profit, but no man can know whether he is really making a profit or not unless he knows his costs.

Profits are not all, however. No man can know whether his organization is really efficient or not unless he knows his costs and unless he has some standard of costs, either the average for his field or the figures of the lowest producer which he can use to compare with his own. It is vital to us all to develop the highest industrial efficiency of which we are capable today. In one sense, this whole war is a test of industrial efficiency.

Inefficient Management

In the next place you should examine critically your own management. In my judgment 50 per cent. of the inefficiencies of coal production today are due to poor management. At this meeting your association should recommend that in each district a committee on efficiency be appointed and that it put forth every effort to improve the management of the mines in that district. Many of your properties are well equipped and well managed and might serve as models for all the world. They set a splendid standard for the efficiency committee to measure up to, yet you know that there are hundreds of mines that are not well equipped; that are indifferently operated; that are loading poor coal; in short, that are poorly managed.

I have always thought that the mining of coal could be improved by the use of more supervision. The general manager of a certain property once told me that in his mine he had a foreman to approximately every 200

men. The president of his company, after looking into the matter, asked him to increase the number of foremen and assistant foremen to one to every 40 or 50 men. This was done, and he found that the greater attention to detail, the better care of the property, the decrease in accidents and the general improvement of his organization resulted in a very definite increase in the production.

We found the same fault in many of our shipyards when we had their management looked into. We found many yards had no competent foremen, no layout men, no supervision at all that modern industrial practice demands. We put a sufficient number of good superintendents and foremen into those yards and obtained surprising increases in the efficiency of production. Isn't it worth your while to make this kind of study of your own organizations? When we found that we did not have sufficient foremen or layout men and that many of the men did not know the best methods of work we established schools to teach the fundamentals of shipbuilding to the men and the superintendents.

Labor Must Also Be More Efficient

Labor is playing a greater part in this war than in any other conflict which the world has known, and let me say here that in the United States labor as a whole is measuring up to its responsibility splendidly. The leaders of organized labor in Washington are men of the highest character, patriotism and honesty. All of us who are acquainted with Mr. Gompers' work know that he has endeared himself to the people of America and all of the allied nations by the position which he has taken in this war. He has about him other able men who are equally loyal and patriotic.

On the whole, however, labor as well as capital is not producing that degree of efficiency that it should produce in these trying times. If faulty management is responsible for 50 per cent. of the inefficiencies in the production of coal today inefficiency on the part of labor is responsible for the other 50 per cent.

The reports to the Government show that from 10 to 20 per cent. of the men in the mines are not working as they should. In mines that are given sufficient car supply there are some employees who are not working as steadily as they should. Some of these men fail to work their full eight hours when they do enter the mines. Others work only three or four days a week when they might work six. Under these conditions it is not a question at present of increasing the number of hours the mine operates a day, but it is a question of the men working fuller time each day and working more days in the week.

Have you yourselves done all you can to remedy this condition? The President of one big western Pennsylvania coal-mining company recently found that with a full run of cars a certain number of the cars were standing over at his mines every night and were not being loaded. He took the matter up with his men in a meeting and explained to them the necessity of having increased coal production to carry on the war and brought home to them as best he could their responsibility to mine the coal. After the meeting was over some of the English-speaking miners came to him and said that if the country needed the coal they were willing to stay overtime and get other men to help load the cars that were left over each evening. This spirit can be roused in your men if they are properly approached. They are just as patriotic as you or I. Their sons and brothers are going into the trenches. They will do their part as earnestly as any of us if they understand clearly what their duty is; but it is first up to you, the presidents and owners of coal properties, to do your part by going to the mines personally, obtain first-hand information and explain to your men the great need for increased production.

Labor Shortage After the War

It cannot be doubted that in many industries there will be a decided shortage of labor after the war, not only in this country, but in most of the countries of the world. That country will best succeed which protects its workmen by improving their living conditions, by providing for insurance against accidents and protection for their families, and guaranteeing a fair return from their labor—all under conditions that will be helpful to make the worker a better citizen. The country taking those measures will be the country that will develop and produce the products most economically and will be performing a world service by producing goods at prices that will be fair to other nations. Unless we have efficient management and efficient employees our country will be at a great disadvantage compared to countries which establish these improved conditions.

The building of ships, the mining and distribution of coal, the production and conservation of food products and other important war necessities are all vital to the nation's needs during these trying times. No great task can be undertaken, if quick action is to be obtained, without the making of some mistakes. We may make mistakes, but we are moving forward and getting results. We cannot go far wrong with the American people united and working for victory. If each of you will do your part, putting your country above everything else, we will win. We have a country worth working and fighting for, and we have a leader worthy of our best support—a great American—the commander-in-chief of the army and navy, Woodrow Wilson.

Large Picric-Acid Plants

Contracts have just been completed by the Ordnance Department for the establishment of two large picric-acid plants. Sites have been selected at Little Rock, Ark., and Brunswick, Ga., and the construction work will be rushed at once by the contractors. Men and material for the buildings are already on the ground at Little Rock, and it is expected that the plant will be in operation by September. The Everly M. Davis Chemical Corporation has been awarded the contract for the Little Rock plant, the construction of which will cost approximately $4,000,000. A larger plant is to be constructed by the Butterworth-Judson Co., New York, at Brunswick, at a cost of nearly $7,000,000. These are the first Government-controlled picric-acid plants to be established in this country. The sites were chosen in the South after a most careful investigation of housing, labor, transportation facilities and strategical conditions. In choosing the Little Rock location the Ordnance Bureau was able to take over a number of buildings which will be used as part of the plant.

The Inspection of Machine Tools

By ETHAN VIALL
Managing Editor *American Machinist*

We have had numerous requests from Government inspectors and others for some definite information as to the best methods of testing the accuracy of different machine tools. For this reason the testing methods used in some of the well-known machine-tool building shops are herewith presented.

IN DESCRIBING the various methods of testing the accuracy of machine tools it is well to begin with lathes, as with the possible exception of drilling machines there are probably more of these machines in use than of any other one class.

For the final inspection of their finished lathes the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio, uses as a guide for its inspectors the card shown in Fig. 1. Taking up in order the items listed on this card, which is the testing of the relation of the spindle with the shear points, it is found that to make this test a specially ground aligning bar is placed in the spindle nose and indicated to run true. The indicator is then set as shown in Fig. 2 and moved to the position against the nose shown in Fig. 3. The variation for this length must not exceed 0.001 in. and must be toward the front. The reason for this is that the pressure of the tool under working conditions tends to correct the error, whereas with the variation toward the back the tendency of the tool pressure would be to increase the error.

Next the indicator is placed to indicate along the top of the bar from the outer end to the spindle nose, a limit of 0.001 in. variation being allowed. This variation must be up; that is, the test bar must point upward. In this case the reason is that the wear on the lathe has a tendency to correct the error. A variation downward would exaggerate it.

Tailstock With Head

In testing the relation of the tailstock with the head, true centers are placed in the spindle nose and tailstock spindle. A test bar is then placed on these centers, as shown in Fig. 4. This bar has a collar near each end, these collars being ground to exactly the same diameter. The indicator is placed on the top of these collars in turn. This tests the height of the tailstock-spindle center with the headstock-spindle center. The amount of error allowed is 0.001 in. high for the tailstock center. The tailstock being movable the tendency is to wear downward and for its center to become lower, consequently correcting the error if the center is originally too high.

The next test is made with the bar in the same place, the indicator being run against the front of the ground collars instead of on top. This tests the alignment of the tailstock and headstock spindle centers to see whether there is any error either toward front or back—0.001 in. is allowed either way. It will be noted that the lathe operator can correct this error by simply setting over the tailstock with the screw for side adjustment.

The foregoing tests are made with the tailstock spindle run back as far as possible to give the center a very close-up bearing.

The spindle is now extended to its limit and the tests repeated for both height and side variation.

Another method of making this last test is to leave the indicator in position against the collar nearest the tailstock and to extend the tailstock spindle, watching the indicator to see if there is any variation as the tailstock slides back and the tailstock spindle is extended. In this way there is no necessity for running the indicator over both collars.

Spindle With Cross-Slide

To make this test a skin cut is taken across the faceplate as shown in Fig. 5. A straightedge is now placed aginst the faceplate with four pieces of testing paper underneath it, as shown in Fig. 16. The operator, by pulling on the bits of paper, can tell whether or not there is any variation of the cross-slide from a true right angle with the center line of the spindle. A variation of 0.001 in. is allowed in the diameter of the faceplate.

LATHE INSPECTION CARD
WITH LIMITS EXPRESSED IN THOUSANDTHS OF AN INCH

Am. Form T 35 11-4-06 6/66

INSPECTION CARD.

Lodge & Shipley Machine Tool Co.

Size Machine.....
Order No.....Shop No.....Machine No.....
ALL TESTS MADE IN THOUSANDS.

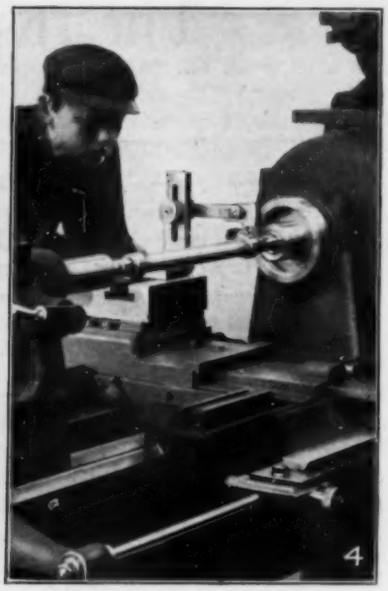
Spindle with Shear Points USE TEST ARBOR.	Top { Up 0 to .001" / Down 0 } Side { Front 0 to .001" / Rear 0 }	Aligned by A
Tailstock with Head	{ High 0 to .001 / Low 0 } Side { Front 0 to .001" / Rear 0 to .001" }	Aligned by B
Spindle with Cross Slide	Loose Front 0 to .001" / Straight 0	Aligned by C
Face Plate	Hollow 0 to .001" in 13 Diameter / Straight 0	Tested by D
T/A with Shear	Parallel 0 to .001" in 24"	"
Back Gear Runs	OK	"
Bore of Spindle Runs out	0 to .001" in 24 inches	"
Bush in Spindle Runs out	0 to .001" in 24 inches	"
Chuck Runs		

Inspected.....190.....
By.....
SEE REVERSE SIDE FOR GENERAL INSPECTION
174

NOTE— ABOVE APPLIES TO FINISHED LATHE
EACH SEPARATE PART IS INSPECTED IN PROCESS

FIG. 1. LATHE FINAL INSPECTION CARD

The taper attachment test is made as shown in Figs. 2 and 3. The bar is placed in the spindle nose as shown. The taper attachment is set at zero and the compound



FIGS. 2 TO 4. VARIOUS SPINDLE TESTS
Fig. 2—Spindle and taper attachment tests. Fig. 3—Second position of spindle test. Fig. 4—Aligning tailstock with head

rest clamped to the taper shoe by means of a locknut provided for this purpose. The carriage is now run back and forth, the shoe traveling along the taper bar and the indicator traveling along the testing bar in the nose of the spindle. The taper bar having been set at zero there should be no variation of the indicator when run along the testing bar. A variation of 0.001 in. is allowed in 24 inches.

The next test is that involving the various back gears. This test is simply to see if the gears of the lathe run silently and that they mesh properly when the various levers are shifted.

The spindle bore is tested for run out by the method shown in the halftone illustration, Fig. 2, the indicator being placed against the end of the test bar and the spindle rotated slowly, the operator watching the indicator to see if there is any variation as the bar turns against the indicator. A maximum of 0.001 in. variation at 24 in. from the spindle nose is allowed.

Bushing in Spindle Runs Out

This is tested by placing the center in the bushing, the indicator being held against the spindle as shown in Fig. 7. A bar is also placed in the bushing similar to that shown in the spindle in Fig. 2. The bar is rotated as previously described. A variation of 0.001 in. in 24 in. is allowed.

The test of the chuck is made as shown in Fig. 8.

FIG. 5. TAKING A SKIN CUT OVER FACEPLATE

FIG. 6. TESTING THE FACEPLATE WITH STRAIGHTEDGE

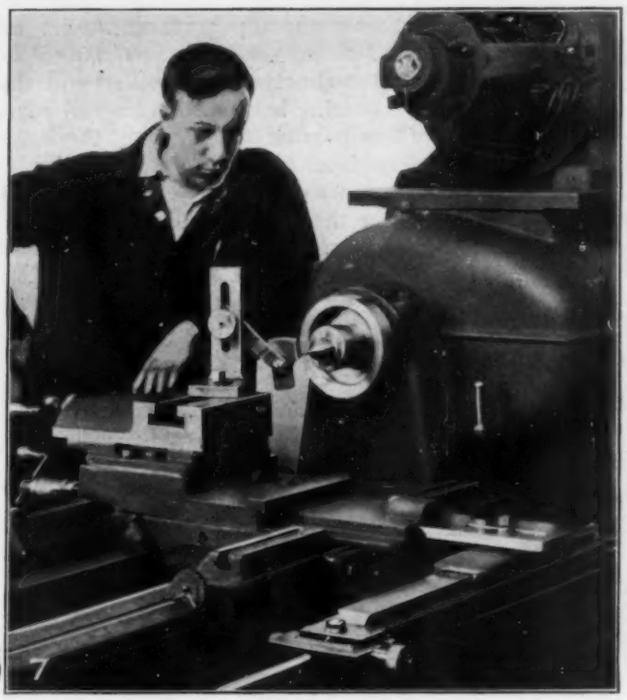


FIG. 7. TESTING HEADSTOCK-SPINDLE BUSHING

FIG. 8. TESTING THE TRUTH OF THE CHUCK

The first test is made with the indicator against the face of the chuck. A variation of 0.002 in. in the full swing of the chuck is permitted. The indicator is then placed against the outside of the chuck and the chuck again rotated; a variation of 0.001 in. is allowed on the outside diameter.

This chuck test is of course only made where the chuck is being fitted by the lathe maker. In a great many cases the chuck is fitted by the customer.

The faceplate test is made at the same time that the spindle with the cross-slide test is made and really only requires the entering of a duplicate measurement. The test with the straightedge and the four pieces of paper tests both the faceplate and spindle with the cross-slide.

Testing Planing Machines

The final tests on the machines made by the Cincinnati Planer Co., Cincinnati, Ohio, are as follows: After the housings have been mounted on the bed the alignment of the face of the housings is tested by using a

FIG. 9. TESTING TRUTH OF HOUSINGS

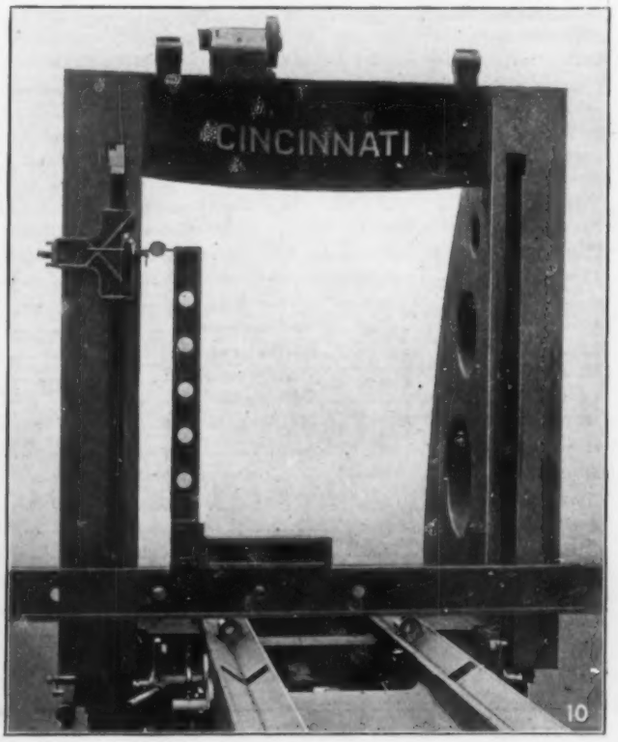


FIG. 10. TESTING TRUTH OF HOUSINGS

INSPECTION REPORT ON CROSS RAIL
This card must stay with cross rail until machine is tested and filed with FINAL TEST CARD.

Play in R. Hd. down feed screw ✓	Left hand ✓ limit .004
Grad. and figures on Saddle ✓	On all Collars ✓
Tool block cut paper with tool clamped ✓	Tool block taper pin fit ✓
Gib screws fit tight in slide ✓	All nuts tight ✓
Swivel stud fit tight ✓	Miter gears run smooth ✓
Saddle fit same on end and center ✓	All corners beveled ✓
Feed gear free with trigger gears ✓	Gear guard clear ✓
Crank handles fit all squares ✓	Square plug in crank handle ✓
Rounding of bolts and Studs ✓	General finish good ✓
End of Rail screw true ✓	Feed rod run true ✓
Tool Block clamp paper both sides ✓	Clamp screws fit tight in saddle ✓
Slide bearing on harp ✓	Clamp screws fit tight in Rail ✓

(OVER)

FIG. 11. CROSS-RAIL WITH WAYS INSPECTOR'S REPORT CARD

level square, as shown in Fig. 9. This level square is placed on the housing on the one side and then the reading taken on the opposite housing. This test shows whether one housing is leaning on an angle from the other or whether they are perfectly parallel.

After the test is completed satisfactorily, the housings are tested out, as shown in Fig. 10. Two accurately ground rollers are placed in the ways of the bed and a straightedge placed over the top of these rollers on which is mounted a 3-ft. square. A special indicator-holding fixture made of aluminum fits the face of the housing and takes a bearing both on the dovetail edge, which is inside of the housing face, and on the outer edge of the housing face. This indicator holder is moved up and down the square, the permissible error being 0.001 in 3 ft., or the height of the square.

The cross-rail is inspected according to the card shown in Fig. 11. When the machine is completely

INSPECTOR'S REPORT
FILE IN OFFICE WITH OTHER REPORTS ATTACHED

No. 6 Lot 380 Size 48×48×14 dist. bet. Vees 24 Mach. No. 3328
No. of Rail Hds. 2 Side Hds. 2 Customer Westinghouse
Style Drive Reversible Motor Drive

BED levels ✓ high ✓ low ✓ Vees high ✓ low ✓ thousands in 10 ft.
Oil rollers clear sides of socket ✓ correct height ✓ Riveted at bottom ✓
Chips cleaned out of end pockets ✓ End pocket drilled and tapped for drain ✓
COUNTERSHAFT Loose pulleys revolve freely ✓ oilers in right position ✓
Hanger arm allow Shifter rod to clear return pulley ✓
Pulleys show balancing lugs No Countershaft
Oil rings run free ✓
FRICTION Run true ✓ turn free by pulling on pawl ✓ adjusting block set in center ✓
Links clear all projections ✓ screw in hub flush ✓ Segment stud tight fit ✓

HOUSINGS Plain or M. D. Plain Arranged for Side Hd. Yes Br'k't on for tu-speed No
Tongue tight drive ✓
MISCELLANEOUS Crank handles fit all squares ✓ All stamped with Mach. No. ✓
Wrench fit tool block ✓ dog bolts ✓ Rail clamp screws ✓
Elevating device correct for tu-speed No Patent plate on Yes.
Planer was run at 30' cutting speed 90' Return speed
All studs match ✓ Specials are None

Elevat. device attached by Reed & Cooper Housings erected by
Running gear put in by Reed & Cooper Side Hds. attached by Same
Shifter attached by Reed & Cooper Top drive put in by
Special put in by Table Top finished by
MOTOR DRIVES ONLY Motor is located ✓ Was motor tested had trouble with
Make of motor H. P. Amperes Volts
No. of motor Type Direct or Alternating
Was motor attached here Westinghouse Reversing Equipment
Speed of Motor
Make of Controller Type No. H. P.
Controller placed Wiring diagram attached
Master switch is located Any line switch
MOTOR FOR ELEVATING Make H. P. Volts Amperes
No. Type Must be Shunt or Compound for rapid reverse or forced lubrication
Single or double throw switch Any starter or controller
Was motor attached here

Fig. 12. FRONT OF INSPECTOR'S REPORT CARD

RAIL with top of table 6 high ✓ thousands ✓ low on ✓ side
Rail with top of table 12 high ✓ thousands ✓ low on ✓ side
Rail with top of table 18 high ✓ thousands ✓ low on ✓ side
Rail with top of table 24 high ✓ thousands ✓ low on ✓ side
Safety screw in clamp hold rail in position ✓ Rack pinion clear housing
Rail clamp and screws clear side Hd. screws ✓ Rail clear arch ✓
Zero line on harp ✓ Gear guard clear ✓ End of Rod and Screw run true ✓
Max. feed of rail Hd. 5/8 Max. height under rail 50"
Anything special No
RUNNING GEAR Are gears noisy No run smooth ✓ bearing on teeth ✓
Oil grooves open to end of bearing at top ✓ take oil freely ✓ at both ends ✓
Name, special large bearings None New sizes are
Oiler Pipes on proper level ✓
Steel gears and steel Rack
SHIFTER and PULLEYS High spd. shaft taken out Scratched Smooth
Pulleys run true Tight Pulley rubbing Pulley
Belt arm studs good fit No Pulley
Loose Pulley throw any oil Table dogs slide free ✓
Full travel of tumbler front dog has 1/4 clearance back dog 1/4 has clearance
Belt Arms adjusted for proper belt travel Locking Plunger set cam neutral
Specials None
SIDE HDS. Maximum feed 5/8" Right Head 5/8" Left Head
Right Hd. .001 thousands out with table in 36 inches in out at top
Left Hd. .001 thousands out with table in 36 inches in out at top
Taper Pin fits tool block ✓ Tool block cut paper ✓ Gear guards clear belt and gears ✓
Grad. and figures on Saddle ✓ on Collars ✓ Crank handle clear belt or motor ✓
Cable clear rail ✓ Housing Edge ✓ Rackcounter balance rope

TABLE Sides are out ✓ thousands in full length Marked right or left Yes
No. of Tee slots 3 Are they standard Yes Are they smooth ✓
Side square with top ✓
Width of table 40" Top plained very smooth ✓ Box or stand type Box
Dia. of stop holes 1 1/8" are Thousands over or under size

Gear guards allow Clearance Do they clear all gears ✓
Anything special No

Date 11-14-17 Inspected by L. C. Smith
Remarks
Was Machine knocked down Properly skidded
Was Machine properly slushed Properly blocked in car
Condition of painting of car floor

Date 11-15-17 Approved by J. Suckers Shop Supt.

FIG. 13. BACK OF INSPECTOR'S REPORT CARD

assembled and put under the belt the inspector is obliged to check over each question on the inspector's report shown front and back in Figs. 12 and 13. After this has been done a reading is taken from the side of the housing, as shown in Fig. 14. The position at which the bulb in the level square stops is noted and this level square is then placed on the top of the cross-rail, Fig. 15. This gives the alignment of the cross-rail with the side of the housing. After this has been set perfectly square its entire height the rail is lowered and the last thing done is to take a cut off the top of the table on its own bed. The slots are also slotted out exactly to size and are made to fit standard plugs so that any jigs made

for a certain size machine will interchange with those of any other of the same make.

While making the various tests described in this and a following article on the same subject the inspector should pay special attention to having the various surfaces wiped clean. One of the troubles experienced by men with little knowledge of inspection methods is the overlooking of apparently unimportant details regarding the removal of all traces of dust or dirt from points of contact. The next article will describe methods used on lathes and other machines.

FIG. 14. USING LEVEL SQUARE AFTER CROSS-RAIL IS IN PLACE

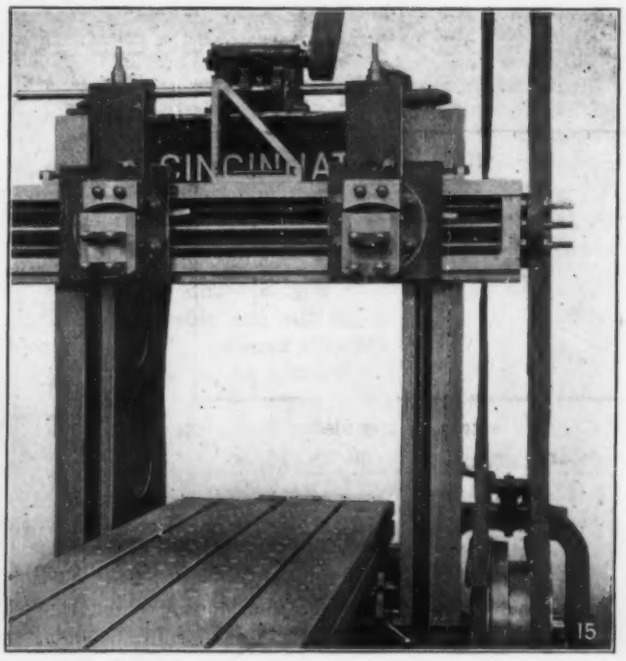


FIG. 15. TESTING LEVEL OF THE CROSS-RAIL OF THE PLANING MACHINE

Insuring Hot Meals of Good Quality for Shop Workers

The American Tool Works Co., Cincinnati, Ohio, has inaugurated a coöperative-restaurant service which promises to work out to the mutual advantage of the men and the company. It involves several novel features, the most striking being that the meals are served to the men at their stations in the shop instead of as usual in the dining or lunch rooms.

It is intended to serve only the best quality of food at cost, the price being based on the cost of the material plus the cost of its preparation and a small percentage to cover breakage and depreciation of kitchen equipment. This makes it evident that by carefully handling the dishes and so reducing breakage the cost of the meals can be kept much lower than would otherwise be possible.

The method of service is to publish a bill of fare each week, showing the meals that will be served on the various days of the following week. Each meal consists of two hot dishes in suitable containers, one sandwich, bread and butter, a dessert consisting of fruit or pudding, and coffee or milk. These are all packed in a suitable lunchbox and delivered hot to the various departments for distribution at 12 o'clock noon for the day force and 12 o'clock midnight for the night force. This makes it possible to serve the meals promptly, and so conserve as much of the lunch-hour period of the men as possible.

Coupon books containing five double coupons are sold for $1, each coupon being good for one meal and are redeemable in cash if they should not be used. Each coupon is in two parts, one for ordering and the other for paying for the meal. The coupon box is placed beside each time clock, and in it is deposited the order coupon for the next day's meal, this being done when ringing in after the lunch hour. These order coupons are gathered up at 1 o'clock and no orders are taken after that hour. If for any reason the man has not rung in by 9 o'clock the next morning the order is canceled and the coupon returned.

This plan seems to have many advantages, and judging by the bill of fare, a sample of which is reproduced, it allows the serving of substantial meals at a very low rate. Its ultimate success depends upon the complete and careful coöperation of the men and has an added value on that account.

Monday, Apr. 22	Wednesday, Apr. 24
Pork and Beans	Vegetable Soup—Crackers
Browned Potatoes	Beef Casserole
Stewed Corn	Browned Potatoes
Apple Sauce	Bread Pudding
Cake	Bread and Butter
Bread and Butter	Coffee or Milk
Coffee or Milk	
Tuesday, Apr. 23	**Thursday, Apr. 25**
Lamb Stew	Chicken Pie
Boiled Potatoes	Mashed Potatoes
Peanut Butter Sandwich	Pimento Cheese Sandwich
Sliced Peaches	Apricots
Bread and Butter	Bread and Butter
Coffee or Milk	Coffee or Milk

State on your order whether coffee or milk is desired. In the absence of this information coffee will be served with your dinner.

It is becoming generally recognized that the efficiency of any working force depends to a large extent on the way in which the men are fed at the middle of the working period. An interchange of ideas on this subject cannot fail to be beneficial.

Champion Reamer Gang

THESE are the men who reamed the punched holes in the plates in the 27-day ship at the New York Shipbuilding Corporation's plant, Camden, N. J.

The holes in the plates are reamed to make them match up so that the hot rivets can be passed through the holes in the two plates. It may not look like much of a job to just hold the pneumatic reaming machine while the air power does the work, but just try it for 10 consecutive hours, kept on the jump all the time by the knowledge that the fastest gang of riveters in the yard is on your heels. After you have done one day of it, turn out the next morning and put in the next day at top speed. After repeating this program for 27 days see whether it is a snap.

Perhaps you don't care for competitions; it may not interest you whether the gang following your operation catches you and is forced into idleness. It may not make any difference to you personally, but it may be a matter of life or death to the boys at the front where every day is 24 hours without overtime. That was what this gang was thinking of during the 27 days it put in reaming more holes than had ever been reamed before in any similar space of time.

Getting the Soldiers in Their Proper Places

SPECIAL CORRESPONDENCE

One of the greatest problems ever tackled by any nation was our attempt to make the first draft of men for the National Army really selective, to not only try to avoid taking necesary men out of industry but to also fit each man in the army into the particular niche where he could render the best service. It goes without saying that we did not succeed in every case, for this is not the day of miracles. And we can probably all recall flagrant violation of the principles we had hoped to follow. But draft boards are only human and the task was too gigantic and too quickly thrust upon us to expect perfection. Still we have progressed and we are still progressing and some rather remarkable progress is being made in several directions.

TO BEGIN with every registrant is now listed on a card which gives a rather comprehensive history of his life to date, so that a complete card index of every man is filed for reference at any time. This classification of personnel is largely due to the efforts of a committee of that name authorized on Aug. 5 of last year, and the result it has accomplished reflects great credit on its activity since that date. This classification has for example enabled the easy selection of 109,487 men for transfer out of the divisions and into other branches, largely technical work, and many more for transfer within the divisions.

A central personnel bureau makes possible the prorating of requisitions among divisions according to their supply of necessary men. To date requisitions for 59,793 men have been handled, and information has been supplied concerning the occupational qualifications at a given time of all the men in the several divisions or depot brigades.

A qualification card for officers, furnishing a record of occupational, educational and military experience and a rating by superior officers has been developed for all divisions in this country in the Coast Artillery and the Quartermaster corps. A similar system is being planned for the Signal Corps.

A uniform system of rating officers has been established in all divisions in this country in the Coast Artillery and the Quartermaster corps. A modified system is being developed for the Signal Corps. The rating system was first installed in eight officers' training camps, first series to select candidates for commissions. It was used as an aid in selecting candidates for the last officers' training schools.

System of Trade Tests

To increase the accuracy of selecting skilled workers among the enlisted men a system of trade tests has been developed. Exact and comprehensive definitions of the more than 600 different trades represented in the military organization have been brought together in a 300-page book, "Trade Specifications." Tables have been prepared showing the detailed needs of each unit for skilled and semiskilled workers. Work has been done in refining methods of selecting and training men for special duties in the navy, special service regarding selection of aviators, assistance to the Provost Marshal General on the questionnaire, and assistance rendered the Surgeon General for general intelligence tests for enlisted men and officers.

The war-service exchange answers inquiries of persons desiring to serve the army. It informs the Department of Labor of the needs which the War Department has for men. The committee began work with a personnel of 10 members. At present its personnel numbers 85. The appropriations and expenditures of the committee have been as follows: Total appropriation for all work, $150,000; expenditures, $100,641.

Every endeavor is being made to fit men into their proper places in the army and in industry. The transfer of men from one branch of the service to another is in charge of Major E. N. Sanctuary, while the taking of men out of the army for service in industry is handled by M. D. Delaney.

Both of these have offices in the State, War and Navy Building Washington, D. C.

This whole division is a new departure in connection with armies, but has a sound basis, as a man may be worth many times in one place what he is in another. That there are over 600 trades listed in the book referred to gives an idea of the complexity of the modern army, and proves, if proof were needed, to what a tremendous extent modern warfare is a matter of engineering and of mechanics.

The Classification Committee

The Committee on Classification of Personnel in the Army is a civilian body composed of psychologists, employment managers and other specialists in job analysis. Through this committee an organization has been built up in all the army divisions by which all privates and enlisted men are classified according to their occupational qualifications and all commissioned officers according to their military qualifications. The cards upon which these records are entered are filed for the enlisted men in a division-personnel office and for the officers in the office of the commanding general of the division. In the case of officers in the Staff Corps a duplicate card is filed in the offices of the respective corps at Washington.

Because of this system thousands of men have been assigned to specific work in the army for which their previous experience especially fitted them. A good example of this service comes from one of the Southern cantonments. A colonel of a regiment of engineers came to the division-personnel officer for help in finding a man for the most responsible position an enlisted man can fill, that of regimental sergeant major. The colonel was looking for a mature man of commanding presence and force of character, with military experience. He wanted someone who had had clerical experience, preferably as an accountant, and who also had had engineering training. The personnel officer found him a man who met even these varied specifi-

cations. As a lad this man had enlisted in the navy and risen to the rank of machinist's mate. He had then left the navy and worked for two years or so as a stenographer and bookkeeper, and at the time of his enlistment in the National Guard Army last fall he was a senior in the engineering school of Tulane University. Moreover, he was a private in that colonel's own regiment.

Up to the present time classification has been on the basis of a personal interview, which was first conducted by the company commander. After a fair trial this procedure was discontinued, and it is now made by officers who have been especially instructed for the work and who are known as members of the interviewing board. This system has given satisfactory results. In one transfer of 800 men to a pioneer regiment it was estimated that 97 per cent. of the men came up to the specifications of the colonel. In some cases where specialists were needed the system has not worked so well.

The Trade-Test Division

In order to improve still further the system it is contemplated to establish trade tests in each cantonment. These take three forms: oral questions, photograph tests and performance tests. In the photograph test the tools of the trade under question are reproduced and the soldier is called upon to identify them, to state what they are used for and often to point out which should be used on specific jobs named. According to the score the soldier makes in these tests he is adjudged a novice, an apprentice, a journeyman or an expert.

A small handbook, "Aids for Interviewers," prepared by Mark M. Jones, has already been distributed to personnel officers. Two groups of experts are being employed in the Trade-Test Division of the committee on this work, the first in developing the questions and tests on the basis of the best sources of information available in the country, and the second devoting its energies to careful and painstaking try-outs of the tests upon groups of apprentices, journeymen and experts so as to ascertain just how they work out in practice.

Another phase of the work of the Trade-Test Division has been the development of a book, "Trade Specifications," by J. J. Swan, recently reviewed in these columns, which gives an exact, comprehensive definition of some 600 different trades, together with a statement of the trades which can be drawn upon as substitutes. An extensive index to this book makes it possible to locate, regardless of the term that may first be thought of, any one of the specifications. A simpler index is also furnished personnel officers for reference when interviewing men. This index of occupations has become the standard list of terms by which occupations are referred to by all army personnel officers, particularly when submitting requisitions to the War Department.

The first trade-test department in a camp was established at Camp Joseph E. Johnston, Jacksonville, Fla. Others will be inaugurated as rapidly as possible.

In order that divisional personnel officers may be more thoroughly informed as to what types of skilled and semiskilled men are needed in the various units of a division a series of tables have been prepared showing what each unit requires. For example, the following table shows the needs of a radio company of a field signal battalion. In one column is given the various grades and duties of the 75 men according to the Tables of Organization and in a parallel column is given the civil occupations which most nearly fits the man to undertake the military duty; thus:

Table of Organization	Skilled	Partly Skilled	Occupation and Code
1 master signal electrician	1	...	Radio operator and constructor plus engineering knowledge
6 sergeants, first class			
1 first sergeant			
5 chiefs of sections	5	...	Radio operator
9 sergeants			
1 mess sergeant	1	...	Caterer
1 supply sergeant	1	...	Merchant or stockkeeper
7 company duty	7	...	Radio operator
15 corporals			
(1 company clerk)	1	1	Clerical worker who can typewrite
	1	...	General mechanic with small-apparatus experience
12 company duty	...	12	Radio operator or telegrapher
	etc.		

These tables represent a vast amount of work, being based on the reports of many officers in Washington and in the field, including French and English officers. Dr. W. V. Bingham is largely responsible for this present form.

The personnel work first established in infantry divisions has now been extended to all staff corps. As very stringent orders have been issued as to checking these cards at port of embarkation it is absolutely necessary that every man shall have a qualification card. The same system is in operation in the army in France with the one condition that certain information as to a man's military qualifications is there added to the card.

Central Personnel Bureau

In conjunction with the occupational classification of enlisted men there has been established in Washington a central bureau which receives periodical reports as to the number of skilled and semiskilled men in each occupation in the National Army, National Guard and the Regular Army camps. This central bureau has furnished the information as to where skilled men were to be found in the army on the basis of which the General Staff has organized a large number of technical units for such assignments; 235,380 men have been individually selected by division personnel officers on the basis of their occupational fitness. Of this number 159,265 have been handled through the central bureau since its establishment. These totals do not include requisitions for men which did not specify occupational or military qualifications.

This number includes over a hundred capable physicists and meteorologists imperatively needed by the Aviation Section; chemists for gas-defense work; surgical-instrument repairmen; bacteriologists (including one of the ablest men in America for the particular duties required of him by the Sanitary Corps in France); refrigeration experts for the food service of the Quartermaster Corps; 5000 mechanics and technicians for the aviation service, and two-thirds that number for the land division of the Signal Corps; 480 crane operators, 1230 foresters, and thousands of railroad builders, railway-shop mechanics and other workmen for engineer regiments already overseas; 1600 accountants, inspectors, machinists, gunsmiths and other ordnance specialists; 275 French-speaking chauffeurs and an entire regiment of 2600 French-speaking men for Army Headquarters to serve mainly as military police.

There are, however, bound to be shortages along certain lines, owing in a measure to the increased need of men in specialized lines such as airplane mechanics, auto

repairers, blacksmiths, canvas workers, farriers, gas-engine repairmen, harnessmakers, oxyacetylene welders, etc. To train men quickly in these lines 22 special classes have been established in existing educational institutions, and about 7500 men are now being trained in these schools. These will be increased and continued until it is estimated that between 75,000 and 100,000 men will be given training within the next six months. These men are being drawn from the armed forces of the men already in training camps, those about to be called or registrants. The plan is to select most of the men to be trained from among those who have already registered and are awaiting the call to the colors.

THE WAR-SERVICE EXCHANGE

If the Committee on Education and Special Training determines that the men shall not be obtained either from the army or through the draft it may turn to several sources. One of these is the War-Service Exchange, another phase of the activity of the Committee on Classification of Personnel. This exchange was organized by order of the Adjutant General on Jan. 18, 1918, and is a directing agency for those desiring to enter the service whether in civilian, enlisted or commissioned capacity. The War-Service Exchange is able to accomplish this because it is constantly informed of the personnel needs of the Staff Corps. A total of 12,000 written offers of service a month and 1500 personal interviews a month of a similar nature have been handled so far. About 15 per cent. of these men are being placed in Government service. The War-Service Exchange also assists the Staff Corps in active campaigns to secure men of special abilities through connections with universities, engineering societies, commercial organizations, the Department of Labor and other agencies of a similar character. On Mar. 15 it took over the work of the Intercollegiate Intelligence Bureau. The War-Service Exchange is in a sense a liaison agency between the War Department and the Department of Labor. It is charged with keeping informed as to such needs of the Staff Corps as the Department of Labor is prepared to supply through its Federal Employment Service and the Public-Service Reserve and with reporting such needs to the Department of Labor.

Another activity of the Committee on Classification of Personnel is the development of accurate methods for the rating of officers and candidates for commissions in the officers' training camps. This work is based on the rating scale devised by Dr. Walter Dill Scott for use in selecting salesmen under the auspices of the Bureau of Salesmanship Research at Carnegie Institute of Technology. The rating scale for officers was first used in eight of the officers training schools, first series. Since then it has been adopted for all such schools and was used in connection with the third series in selecting candidates for the schools as well as for rating them while in attendance. Its use has been further extended so that all line officers in America are now rated by it, as well as all Staff Corps officers. The scale is somewhat modified for officers in the Signal Corps, particularly for pilots and observers. A somewhat different scale has been adopted and is now in use for all civilian employees in the Quartermaster Corps at Washington.

A plan for securing usable information concerning the 9,000,000 registrants was prepared and submitted to the Provost Marshal General and its provisions were partially embodied in the questionnaire issued by the latter to the men within the draft age. The committee also formulated plans for an occupational analysis and card index of all the registrants by which relative drafts could be made. In the main this plan is now being put into operation.

In addition to this a series of intelligence tests have been put into practice at four of the National Army divisions and is being extended to the whole army. The record is kept on the card of the enlisted man and of the officer as well.

Extensive investigations have also been made to determine the best tests for aviators and further tests are now being made in this direction. If a thoroughly reliable method can be found it will prevent the waste of time in training men who are not adapted to this work and should also reduce the number of accidents which occur in training camps. This work is in charge of Dr. E. L. Thorndike. Dr. Raymond Dodge has given much study to filling special requirements of the navy and further investigations are being made.

Taken altogether it is most hopeful and encouraging to find such activity in the line of making proper selections, as in this way only can we hope to secure the best results from the men we are calling from industry. The utilizing of every man where he can be of the greatest service is the ideal to be aimed at in all directions.

Graphical Geometrical Progression by Means of Slide Rule

BY W. W. KINSLEY, JR.

The method proposed by Mr. Kartsher, page 427, Vol. 47, *American Machinist*, for determining graphical geometrical progression by means of the slide rule may possibly be further simplified by using a logarithmic scale that is frequently engraved on the slide.

A geometric progression between two numbers may be defined as an arithmetical progression between the logarithms of the numbers. By using the same example as used by Mr. Kartsher the modified procedure may be explained.

It is required to find six values of a geometric progression from 25 to 360 inclusive.

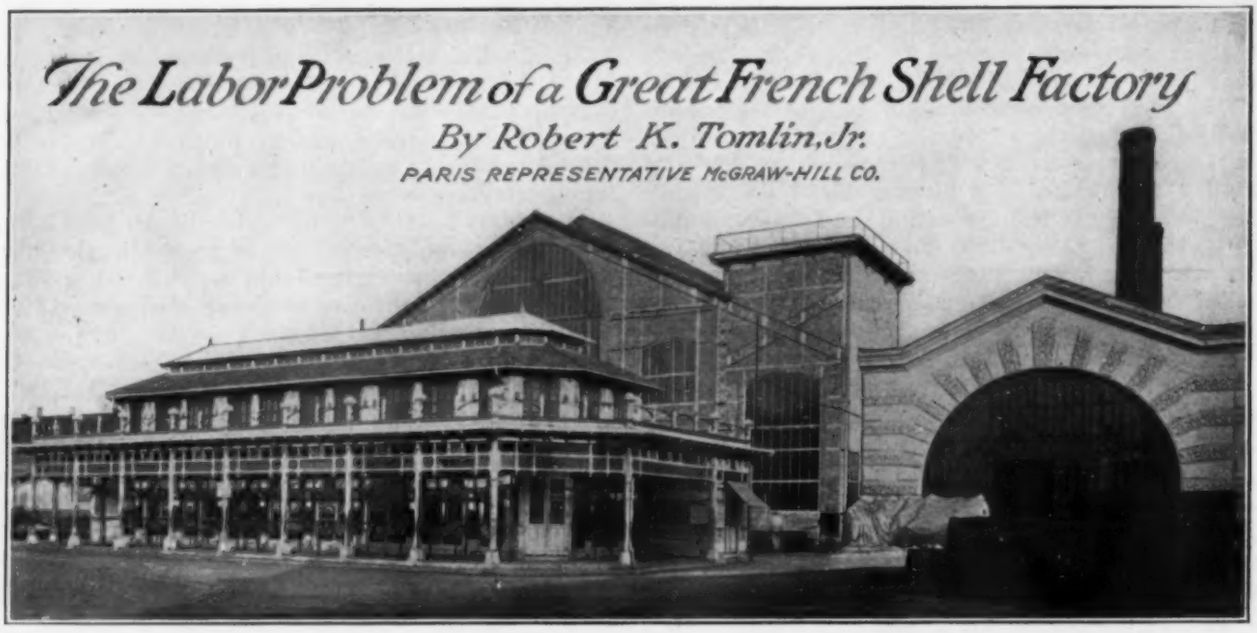
Obtain the logarithms of 25 and 360 by setting the left-hand index of the C scale to the values on the D scale and reading the corresponding logarithmic values on the logarithm scale. These, with the proper characteristics, are 1.398 and 2.556. The difference is 1.158, which divided by five gives 0.2316 as the logarithmic increment for the arithmetical progression. By addition the logarithms of the values in the geometric progression will be found to be:

$$1.3980 + 0. = 1.3980$$
$$1.3980 + 0.2316 = 1.6296$$
$$1.6296 + 0.2316 = 1.8612$$
$$1.8612 + 0.2316 = 2.0928$$
$$2.0928 + 0.2316 = 2.3244$$
$$2.3244 + 0.2316 = 2.5560$$

and by setting the slide to the logarithm the values of the geometric progression can be read directly on the D scale. These readings will be found to be approximately 25.0, 42.6, 72.6, 123.8, 211.1 and 360.0.

The Labor Problem of a Great French Shell Factory

By Robert K. Tomlin, Jr.
PARIS REPRESENTATIVE McGRAW-HILL CO.



The methods employed in the solution of the labor problems in a great French shell factory are here treated by the author, who has been studying the ways in which this plant has been overcoming the difficulties experienced in obtaining an adequate supply of labor by the employment of large numbers of women, many of whom are mothers.

THE plant of André Citroën was built in 1915 for the manufacture of 75-mm. shells and other specialties. Its location is near Paris, which brings it into the vicinity of a large community from which to draw for its labor supply. Nevertheless this does not offset the accute shortage of male help caused by the drafting of all suitable men into the French army, so the planning and administration of the plant has been with a view to employing the highest number of women in the manufacturing operations.

At the time of my visit the employees numbered about 9000 and of this number 6000 were women. The work is divided into two shifts of about ten hours each. The day shift of 6000 employees comes on at 7 a.m., stops at noon for lunch, resumes work at 1:30 p.m., and continues until 6:30 p.m. The hours for the night shift of 3000 employees are from 7:30 p.m. to midnight, and from 12:45 a.m. to 6 a.m. About one-third of the employees live in the immediate vicinity of the works and travel by foot. For the others there are adequate transportation facilities, as the station of the Metro (the Paris subway) is only a few minutes' walk from the shops, and street-car lines are also within easy reach.

FIG. 1. DENTAL-TREATING ROOMS

After an applicant has been examined by a superintendent he is assigned to a shop and receives a time card, a service card, a card indicating the name and location of his shop, the name of his foreman, locker number and the number of the time clock on which he checks in and out. The time clocks are all located in the open-side pavilion shown in the illustration in the headpiece of this article. By this system a man can be set to work in a few minutes. After six months at the same kind of work an employee, on request, is assigned to different duties.

Two systems of wage payment are used—piecework and time. On time work all employees performing the same kind of duties generally receive the same wages, but in some cases bonuses are paid, depending upon the diligence and capacity of the worker. Wherever possible payment is made on the piecework basis.

To save time in paying off the workers the following scheme has been developed: Only even sums of money are given out, irrespective of the actual amount earned, the remainder being credited and issued on the next pay day. Payments are made fortnightly from about 100 windows, each window paying out sums of only one amount. For example, there is a window at which sums of 70 fr.—and only 70 fr.—are paid; another for 80 fr., and so on upward. To receive their wages employees must present vouchers, and to aid in further simplifying the procedure payment cards of various colors are used, the corresponding color being painted on the pay windows. A bureau for adjusting complaints is open continuously.

General or special announcements to the force are

made either in the form of printed sheets or at night by means of illuminated signs over the shop exits. A service has been organized for investigating absences from work by visits to the homes of employees.

Elaborate measures have been taken to safeguard the health of employees, assuming two forms—prevention and cure. In the line of prevention frequent lectures on sanitation and the care of the human body are given, there being special conferences at which female ailments are discussed. Care of the teeth is considered so important that the plant employs a regular staff of dentists, and has provided them with offices equipped with every modern dental appliance. The dental treating rooms are shown in Fig. 1, where 100 patients can be treated every day. Printed bulletins on the care of the teeth are issued regularly to all the employees. There is also a large infirmary (Figs. 2 and 3) with both men and women doctors in attendance.

FIGS. 2 TO 6. VIEWS IN HOSPITAL AND DINING HALL

Fig. 2—Infirmary and corps of nurses. Fig. 3—Skilled attendant giving surgical dressing to an injury. Fig. 4—Quarters for the care of infants of working mothers. Fig. 5—Care of the infants in welfare quarters. Fig. 6—Dining hall with seating capacity for 2700 employees.

In works where so many women are employed the matter of childbirth is an important matter; two factors to be considered in this question are the woman about to become a mother and the care of the newborn infant. With the probable increase of woman labor in American shops this question is one which our executives will not be able to dismiss lightly. Here is the way this situation is dealt with at the Citroën plant. The prospective mother receives 30 fr. a month in addition to her regular wages and must visit the company's doctor twice a month. When her condition becomes such as to prevent her from performing her regular duties in the shops she is sent to a hospital, where all expenses are defrayed by the company. After the child is born the woman is sent to rest quarters, where she remains six weeks before returning to work. For the care of the newborn infants the company has a special building, called the *pouponniere*, equipped with 60 cribs, Fig. 4. Here the infants remain, if the parents so desire, day and night under the care of competent nurses, who give them skilled care, Fig. 5. On Saturday the mother calls for her baby, takes it home over Sunday, and leaves it at the *pouponniere* when she comes back to work Monday morning. During the regular hours of shop work each mother is allowed two periods for visiting and nursing her child, and additional visits are made before and after hours and after luncheon. This infant ward is light and warm, finished inside with white and blue tile, and is kept scrupulously clean. Every one of the 30 cribs in the ward through which I passed was occupied by a healthy looking infant. They are now building a *garderie*, a building to which the children from the *pouponniere* will be transferred when they have begun to develop. This institution will be large enough to house at one time 150 sons and daughters of the plant's employees.

One of the most spectacular departments of this establishment is the *cantine*, or dining hall, Fig. 6, where 2700 people can be fed at one time. I had the pleasure of eating luncheon in this mammoth hall, receiving the same fare as the workers. It was a mighty good meal—hors d'œuvres, bread, roast lamb, beans, red wine, baked apples and coffee. This meal, without the wine, costs the employees 1.50 fr. (26¼c.), but I was informed that the company loses about 1 fr. per head at this rate. The food is cooked in a large, well-equipped kitchen and is delivered by means of electric trucks, Fig. 7, to warming ovens, Fig. 8, at the ends of the transverse aisles in the hall. The job of feeding 2700 people in one hall involves the transportation of food rather long distances, and unless mechanical means were employed the service would be slow and the dishes cold. Men and women eat together at the same tables, and the meal is much more prolonged than would be the case with American mechanics. One hour and three quarters is allowed for luncheon. With the French this

meal is a very leisurely occasion, and this characterisic was well exemplified at the *cantine*.

Another point is the service provided by uniformed waitresses, and dishes of meat and vegetables are passed to each individual so that the size of the helping is left to him. Adjoining the *cantine* is a club room,

FIG. 7. TRUCK DELIVERING THE FOOD FROM KITCHEN TO DINING HALL

where the employees, men and women, can spend the remainder of the luncheon period.

Various educational and amusement facilities are furnished to the men and women. Every Saturday night in the huge dining hall a moving-picture program is given, where seats are provided for 3500 workers and members of their family. There has been organized among the employees a band of 60 instruments, which gives concerts on these evenings. On such occa-

FIG. 8. HOT PLATES FOR WARM SERVICE OF FOOD IN DINING HALL

sions as Christmas and other holidays special programs of entertainment are arranged.

There are numerous other features of this welfare work. A coöperative store where goods and food are bought in bulk and sold practically at cost is maintained, and classes in English, physics, mechanics and metallurgy; a legal aid department, a social club, a company newspaper and a library of 100,000 volumes are a few of the other special activities.

As we finished out tour of the works and were about to depart I asked our guide, "What will become of this institution with its thousands of employees and thousands of machines after the war, when France will not need 50,000 shrapnel a day? I suppose there will be a wholesale lay-off of workers." He smiled. "On the day peace is declared," he replied, "Monsieur Citroën will have completed plans for taking on 10,000 new men from the returning armies. From shrapnel we intend to transform our plant output into automobiles and agricultural implements."

Reclamation of Material in the Shop

By E. Andrews

The article by H. R. Gilliam on page 417, Vol. 47, *American Machinist* is of more than passing interest because at no time in our industrial history has there been so much need for the collection and utilization of scrap material. In normal times material was plentiful, prices low and deliveries prompt, but at the present time deliveries, if promised at all, are usually from three to twelve months with prices almost prohibitive. To meet these conditions, national reclamation of material is of vital importance. Means should therefore be taken to utilize every piece of scrap possible.

Possibility of Reclamation

The awakening of many manufacturers to the possibilities of material reclamation in their own shops has been a veritable blessing in disguise, for things hitherto deemed of no industrial value are now accepted without question. To cite a recent case in our shop some time ago we received an order for 10,000 conical-shaped articles of sheet metal. The dimensions were 7⅞ in. diameter at the base, 6¼ in. diameter at the top and 3¾ in. deep. They were made of sheet steel $\frac{1}{32}$ in. thick and were required for war service. After the articles had been in use for a few months they were discarded and were sent back to the shops where but for my suggestion they would have been scrapped. The suggestion resulted in 50,000 3¾-in. diameter pieces being obtained suitable for some commercial road-vehicle lamps which we had on order. Ten thousand washers 5½-in. outside diameter were also obtained which were used for hand-signal-lamp parts.

Oxyacetylene Apparatus Valuable

An apparatus which has proved very profitable to our engineering department is an oxyacetylene outfit which has been in service for 15 months. The principal work for which it is used is to repair worn or broken metal parts which would otherwise be considered scrap. It is safe to say that no other outfit introduced into our repair shops during recent years has made possible greater economies.

Employees should be brought to realize that the time and material which they can save in their personal work can have a direct and considerable bearing upon the nation's treasury as well as upon their employer's, and consequently their own, prosperity. Every means should be employed to disseminate these views, and while it may seem a hopeless task to bring all employees to a correct understanding on this important matter a system of education and enlightment could be introduced which would result in a surprising increase in their efforts toward economy.

X. The Bolt and Feed Operating Stud—I

This article is the first installment on bolt and stud work and covers operations of thread milling on internal surface of bolt, machining firing-pin opening, grinding outside, shaving thread shoulders, profiling and milling cam slots and ejector cuts.

COMING now in our study of the Savage factory methods on the Lewis gun to the point where the bolt and the feed operating stud may be taken under consideration attention should first be directed to the group of parts in Fig. 84, which represents various important stages in the progress of the bolt and stud from early operations to completed form. The bolt evolution is represented by the upright parts at the top; the feed-operating stud in its progressive steps by the several specimens lying below.

Another view of the bolt and stud with the two extractors removed from their seats in the sides of the bolt is reproduced in Fig. 85, this second group of gun parts including also the feed-operating arm *A* which is actuated by a lug on the feed-operating stud and so made to operate the feed mechanism. The feed cover is represented in this group at *B* as it appears when viewed from the underside, with the feed-controlling pawls upon their pivotal studs.

It has been deemed advisable in this account of shop practice to carry the production of bolt and feed operating stud under one common title as the two members are operated together in the assembled gun mechanism, and certain features in their manufacture will therefore be the more clearly understood. The bolt is shown in detail in the line drawing, Fig. 86.

For many of the operations on the bolt the work is located and held from the outer surface by a method that is fairly novel in its application to cylindrical parts. This makes it possible to grip the work very tightly, and with the body accurately machined to some specified dimension it enables the work to be handled satisfactorily, while at the desired point in the sequence of operations the method of holding may be changed to centers and the outside ground to finished dimensions. Thus if we refer to the operation schedule herewith we shall find that, after rough turning, burring and centering, the bolt blank is ground to a body diameter practically $\frac{1}{64}$ in. over size. This is done in Operation 3, and not until Operation 53 is the body ground to finished size. In the first grinding, however, the piece is rigidly held to dimensions, and the net result is, of course, that all of the advantages of outside holding are secured and there still remains sufficient material for finishing in a later process without affecting the accuracy of the previous operations.

Milling and Drilling

Referring back to Fig. 84 it will be noticed that the shoulder formed on the bolt body at *A* is shown at *B* milled to form four lugs. These are brought to the required form by straddle milling in Operation 5, sufficient stock being left to allow for subsequent finishing to exact dimensions by a shaving operation in the punch press and specified as Operations 11 and 12. Before reaching this point, however, the bolt passes through other operations, one of which, 6½, consists in drilling and reaming the shape at the bottom of the firing-pin hole, the character of which is indicated in Section *BB* on the detail drawing, Fig. 86. This operation is accomplished in the jig shown in Fig. 87, the hole having already been put in while the work was in the turret lathe. The illustration shows how the bolt blank is secured by gripping it by its cylindrical surface in a

half-round seat formed in a hardened-steel block shown at *A*.

The work is held to the seat by a hook bolt *B*, which grips the work at the middle of the length, and is further secured as well as lolocated endwise by a concave ended clamp *C* which forces the locating lugs into close contact with the inner face of a bushing at *D*. This clamp is drawn down by the swinging bolt and thumbscrew *E*. The guide bushings for the finishing and reaming processes are shown at *D* and *F*. The operation of counterboring the end of the bolt is also accomplished in this jig and the results are tested with the gaging device illustrated in Fig. 88. A most important feature in the machining of the bolt is to get the dimensions correct for the locking-up distance from the back of the bolt lugs to the front end which, when the bolt is locked up, extends to the rear end of the barrel counterbore in the front of the receiver. The depth of the cartridge seat in the front end of the bolt is also of prime importance. The lug, it should be understood, is the important point, for locating the bolt in subsequent operations.

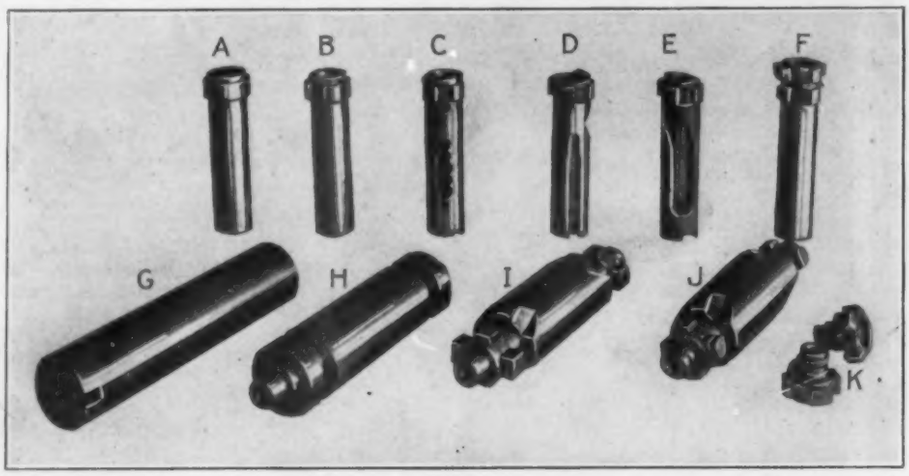


FIG. 84. BOLT AND FEED OPERATING STUDS IN VARIOUS STAGES OF COMPLETION

In applying this device the work rests in the half-round block *A* with the rear face of the lug abutting against a raised stop surface on the end of the bushing *B*, while the two micrometer spindles are advanced to contact with the front end surfaces.

The spindle *N* is aligned with the annular surface left around the bolt end by the counterboring process, and the position of the micrometer is such as to permit the spindle *O* to go to the bottom of the seat. Following Operations 15 and 16 the piece is gaged to determine whether or not it is of correct length.

To facilitate reading, the micrometer heads are so adjusted in the fixture that when the work is finished to the final lengths called for the micrometer readings will be 0.500 in. in each case. For tests following earlier operations the readings are greater by the amount left for finishing.

It will be further noted with respect to this gage that the supporting block for the work is made in duplicate, one of these two blocks being adapted to hold the bolt before finish-grinding operations while the other block has a seat corresponding to the finish size of the of the work.

From the drawing, Fig. 86, we may see that the rear end of the bolt is provided with a square internal thread for the reception of a similar thread on the end of the feed-operating stud, this thread being right hand. The thread starts from the face of the spiral cams at the outer end of the bolt head. The cutting of this coarse-pitch square thread in the small diameter of hole, which is but little over ½ in. in diameter, would be a difficult undertaking without special apparatus. Fig. 89 shows the fixture used for this purpose, which as will be seen is in the form of an attachment for a hand-milling machine in which a small but stiff shank cutter is used for milling the thread. The fixture, or attachment, is composed of a baseplate or head, with a spindle of large diameter as compared with the base itself. This spindle has two important features, one being the semicircular chuck formed at the front end by cutting away the metal, leaving a half-round seat, and the other the threaded rear portion and the worm-operated gear by which the spindle is given a combined rotary and forward movement. The patch of the thread on the spindle is of course the same as that desired for the internal thread of the bolt.

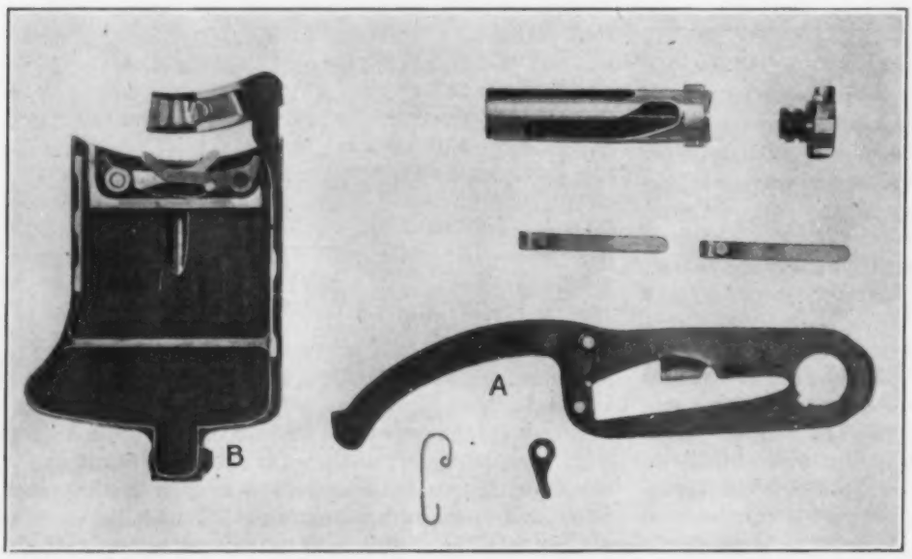


FIG 85. THE BOLT, EJECTOR, STUD AND OTHER MEMBERS OF THE FEED MECHANISM OF THE LEWIS GUN

Here, as in the other fixtures referred to, the work is chucked in the spindle by means of a hooked bolt that draws it down into its seat at the front end of the spindle. In this chuck the work is located in correct position in respect to the degree of rotation about its longitudinal axis by one of its locking lugs which enters

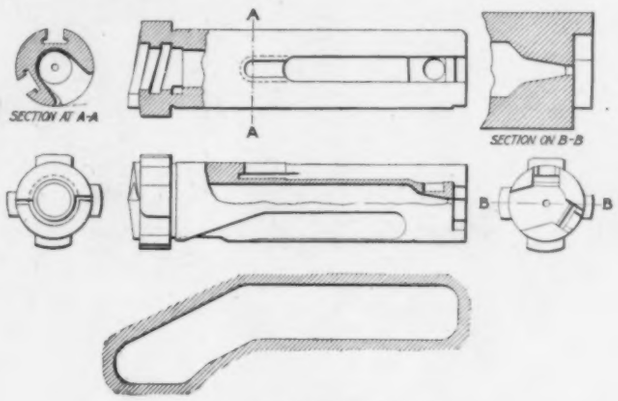


FIG. 86. DETAILS OF BOLT

a setting plate, or gage, that has a rectangular notch of corresponding dimensions. This notched plate, or gage, determines the position of the work in respect to its lugs, and by means of a rod through the center assures the work being held against the working faces of the lugs just as it has been located in the other fixtures applied earlier.

SEQUENCE OF OPERATIONS

No.	Operation
1.	Rough turn.
2.	Burring and centering.
3.	Grind body
4.	Grind top of lug.
5.	Rough lugs with straddle mill.
6½.	Drill and ream firing-pin hole.
8.	True center after reaming.
10.	Hollow mill shoulders.
11.	Shave lugs (rough).
12.	Shave lugs (finish).
13.	Finish back of locking lugs and finish diameter at rear of locking lugs.
14.	Turn grinding-clearance groove.
15.	Drill and ream shape at bottom of firing-pin hole.
16.	Counterbore thread portion.
17.	Mill stop shoulder.
18.	Mill square thread at rear end of bolt (rough).
19.	Mill square thread at rear end of bolt (finish).
20.	Hand tap thread square at rear end of bolt.
21.	Hand thread shoulder right and left side (rough).
21½.	Grind back of stud.
22.	Mill top of stud lug.
23.	Mill cartridge clearance at front end (rough).
24.	Mill cartridge clearance at front end (finish).
25.	Profile first extractor slot.
26.	Profile second extractor slot.
27.	Rough out stock at rear end of first and second extractor slots.
28.	Finish first and second extractor slots at rear end.
29.	Drill first hole for cam slot.
30.	Drill second hole for cam slot.
31.	Profile out front end of cam slot.
32.	Profile ejector clearance at front end.
33.	Profile extractor-plunger clearance slot.
34.	Undercut first and second extractor slots at rear end.
35.	Rough mill rear end of cam slot at right side.
36.	Finish rear end of cam slot on right side.
37.	Rough straighten part of cam slot at rear end on left side.
38.	Undercut cam surface on right side of cam slot at rear end.
39.	Finish straighten part of cam slot at rear end on left side.
40.	Drill extractor hole.
41.	Chip out extractor slots and file cartridge seat.
42.	Draw file cam slot and rack stop.
43.	Emery out inside of cam slot.
44.	File extractor slots and burr sides.
45.	File corners.
46.	Shave thread shoulders to gage on right and left sides.
47.	Mill ejector clearance at rear end.
48.	Round corners of locking lugs front end and countersink extractor slots and file out fillet between lugs.
49.	File cam cut and cam.
49½.	Inspect before hardening.
50.	Harden.
51.	Sandblast.
52.	Lap out firing-pin hole.
53.	Finish grind bolt.
54.	Assemble and line up bolt before polishing.
55.	Shave bolt after hardening to fit stud.
56.	Lap operating stud to bolt on hand-milling fixture.
57.	Emery out inside after hardening.
58.	File end of extractor slot to micrometer gage.
58½.	File side of cartridge clearance seat to micrometer.
59.	Hand polish top and between lugs; file fillet out in front of lugs.
60.	Grind rear end of recoil lugs.
61.	Lap end of recoil lugs after hardening.
62.	Grind cartridge seat.
63.	File and polish cartridge-clearance cut at front end after hardening.
63½.	Finish front end of cam cut.
64.	File corners of lugs on front end, stone corners on recoil lug, corner front end of bolt and recess firing-pin hole.
66.	Stone cam slot.
67.	Break corners at front end of extractor slots and qualify bolt to stud.
68.	Spot harden.
69.	Emery out inside with spindle lathe.
70.	Break corners after polishing.
71.	Stone cam second operation.
72.	Inspection.

The position of the fixture on the milling-machine table is determined by tongues on the bottom so placed as to bring the work spindle into correct relation to the center line of the cutter as determined by the helix angle of the thread to be milled.

THE WORK-SPINDLE WORM

The worm for rotating the work spindle is operated by hand and meshes with a wide-faced spur gear, which as it moves forward maintains a uniform degree of contact with the worm, as the latter is so placed as to bring its angle of helix parallel with the gear teeth.

The wormshaft is carried in an eccentric bushing which has a controlling handle at one end, so that by a quarter turn of the latter the bushing may be swung

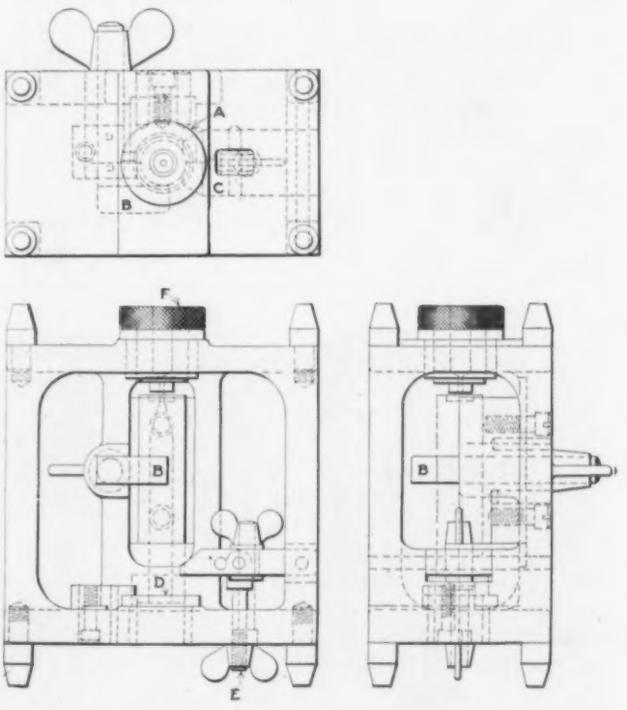


FIG. 87. REAMING FIXTURE FOR INTERIOR OF BOLT

away from the work spindle, withdrawing the operating worm from the gear, thus leaving the spindle free to be rotated by the crank handle at the rear end, a feature of convenience when setting up work or changing from one piece to another.

An end stop for limiting the forward travel of the spindle is fixed into the front of the head in the form of a very large-headed screw *A*, Fig. 90, which is provided with a screw for clamping it when it is once set.

The position of the eccentric bushing for the worm-

shaft and its rotary adjustment are defined by a stop which fits across the bushing head, as indicated in the detail views of Fig. 90. This stop device is also clearly shown in Fig. 89.

The threading operation is carried along with this attachment with expedition and with highly satisfactory

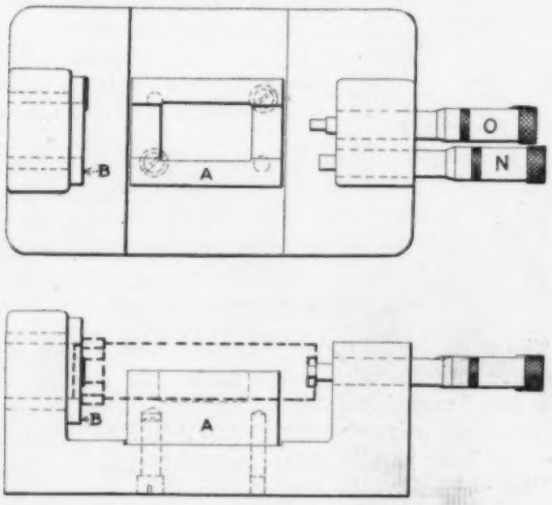


FIG. 88. MICROMETER LENGTH GAGE

results. Two operations are made of the undertaking—roughing and finishing—as it is preferable to get out the stock from the cut to begin with and then use a finish cut for final proceedings rather than to hold the work down to the slow rate of operation that would be necessary if all the metal were to be removed at one pass of the cutter.

Passing over a number of operations that intervene, such as grinding back the shoulder, milling the top of the stud lug, milling the openings at the front end to form the cartridge clearance, profiling the extractor slots, etc., we come to Operation 28, which is finishing the rear ends of the extractor slots. The rear parts of these slots are somewhat narrower than the remaining portions, and at the bottom T-slots are cut the full width of the widest parts. The purpose of these T-slots is to receive the rear ends of the extractors and to prevent them from flying out of their seats in the bolt when the gun is in operation. The cut is made in a profiling fixture, Fig. 91, wherein the bolt is held as before by resting in a half-round channel in a base block. In this instance the bolt is located endwise by a stop against the cartridge seat in the front end, as it is essential that the rear end of the extractor slots be a definite distance from the cartridge seat in order that the extractor hooks may properly engage the cartridge groove to accomplish their mission of withdrawing the empty case from the chamber.

The plan view and the details in Fig. 91 show the character of the form plates used for controlling the T-slot cutter in the profiling machine.

A somewhat similar profiling fixture for cutting the cam slot in the bolt body is illustrated in Fig. 92. In this instance holes have been drilled through the bolt wall to remove as much stock as possible to relieve the profiling cutter, the bolt appearing as shown at *C*, Fig. 84, where six holes have been drilled to remove the stock from the front portion and two other holes at a different angle for the rear end of the cam slot which will later be profiled out to form a sloping cut connecting both

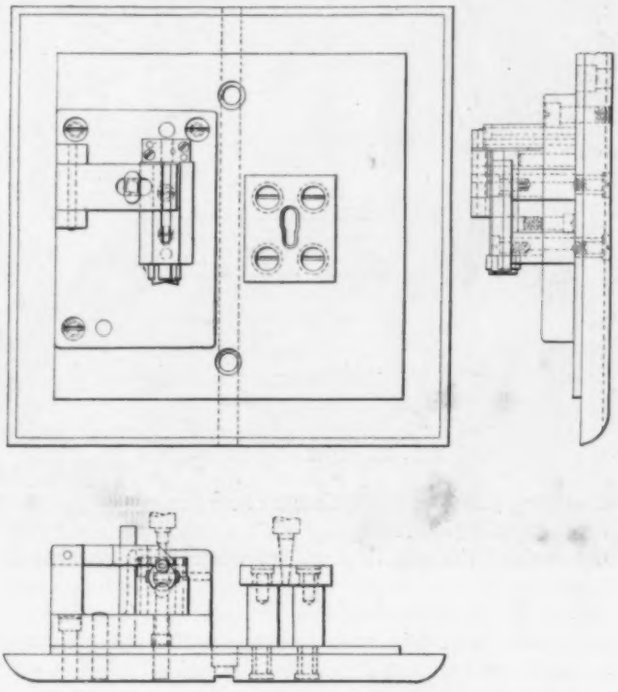


FIG. 91. PROFILING FIXTURE FOR FINISHING REAR ENDS OF EXTRACTOR SLOTS

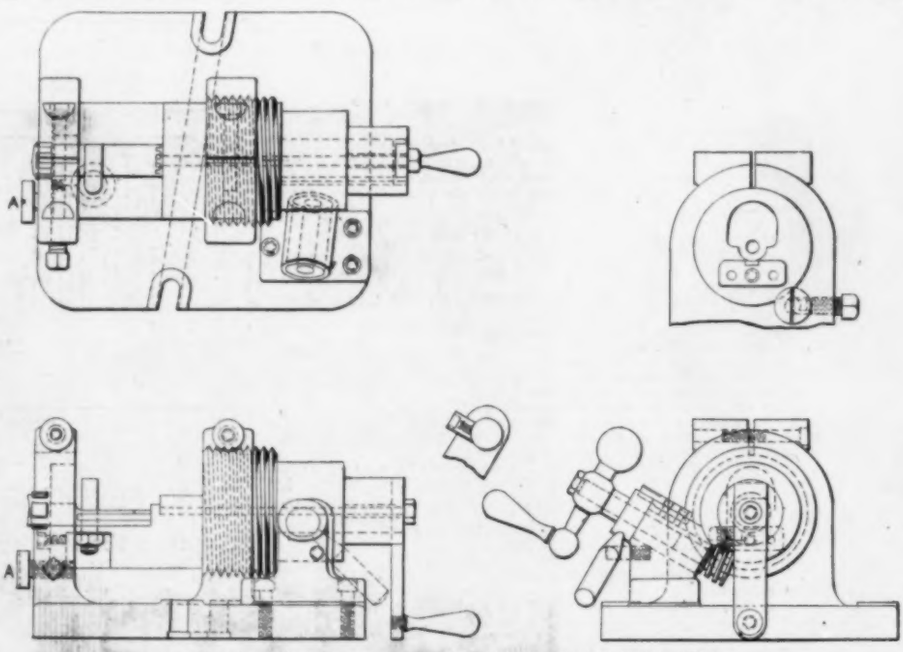


FIG. 90. DETAILS OF THREAD-MILLING FIXTURE

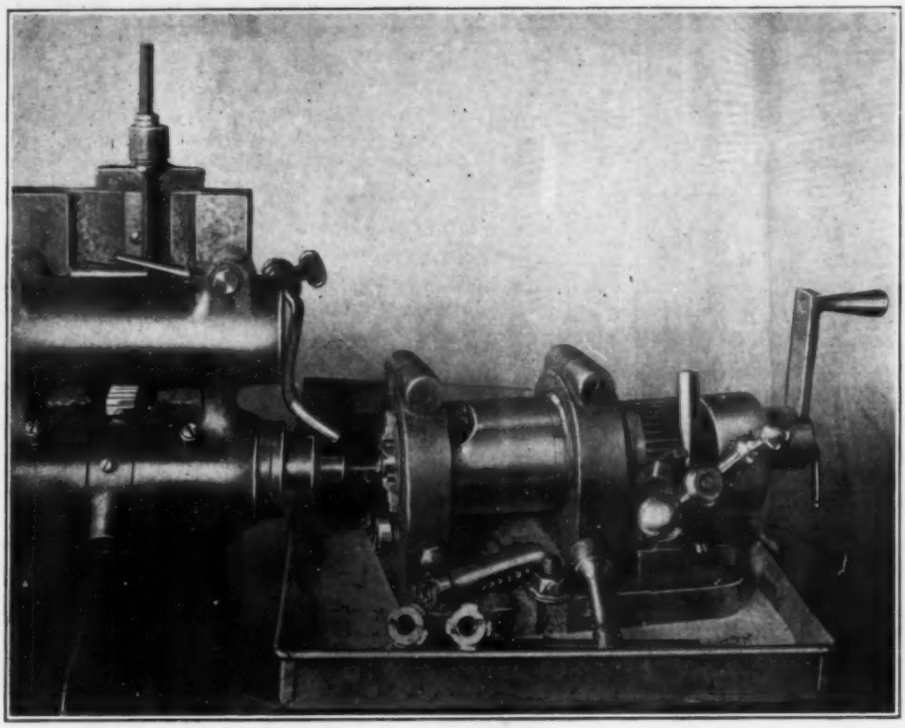


FIG. 89. MILLING THE THREAD TO RECEIVE THE FEED-OPERATING STUD

parts and giving it the appearance presented at *E* in Fig. 84. The purpose of the fixture shown on the profiling machine, Fig. 92, is to mill out the front end of the cam slot. An enlarged detail of the slot is shown in Fig. 86, and from the illustration it may be seen that the cam slot extends nearly two-thirds of the length of the bolt, the major portion of this length being parallel to the axis of the bolt, while the remainder assumes the form of a helix.

The fixture is shown with work in place, and with several bolts before and after profiling lying near by.

The method of locating and holding the work in the fixture generally is similar to that used in connection with the other fixture shown in Fig. 91.

A gaging device for testing the accuracy of the profiling cut is shown at *A* in the foreground of Fig. 92. The gage consists of two plugs *B* and *C*, one square-ended and one cylindrical. These plugs are located vertically over the axial center line of the fixture in suitable heads that are bored out to receive them at about 1¼ in. apart.

The round plug gages the width of the slot. The square one does this also, but it does more than that, as it tests the parallelism of the sides of the cut, and in conjunction with the round plug it establishes at once the correctness of the slot. If the slot is out of line with the true axis or if the sides are not parallel with each other one plug may enter but the other will not, for the slot is gaged for exact width before this test is applied, and consequently no oversized slots come under the plug fixture and enable the work to pass inspection even though of incorrect width in the slot. The end plug in the gage also makes a test of the end position of the slot at the same time that it gages the slot for width and straightness.

The view of the gaging fixture shows the method of setting the bolt in position by resting the front end against the cartridge seat and fixing the position of the work in respect to the angular location of its lugs by locating the lug in the stop on the gage.

The next installment of this series of articles will describe the finishing of the bolt and the work involved in turning, threading, shaving and cutting off the studs. Two studs are put through at one time on opposite ends of a 6-in. length of steel, thus permitting short lengths to be conveniently handled. After approaching completion they are cut off and the ends are given the required finish. Further installments will take up various operations involved in the manufacture of the barrel and other important functioning parts of the gun.

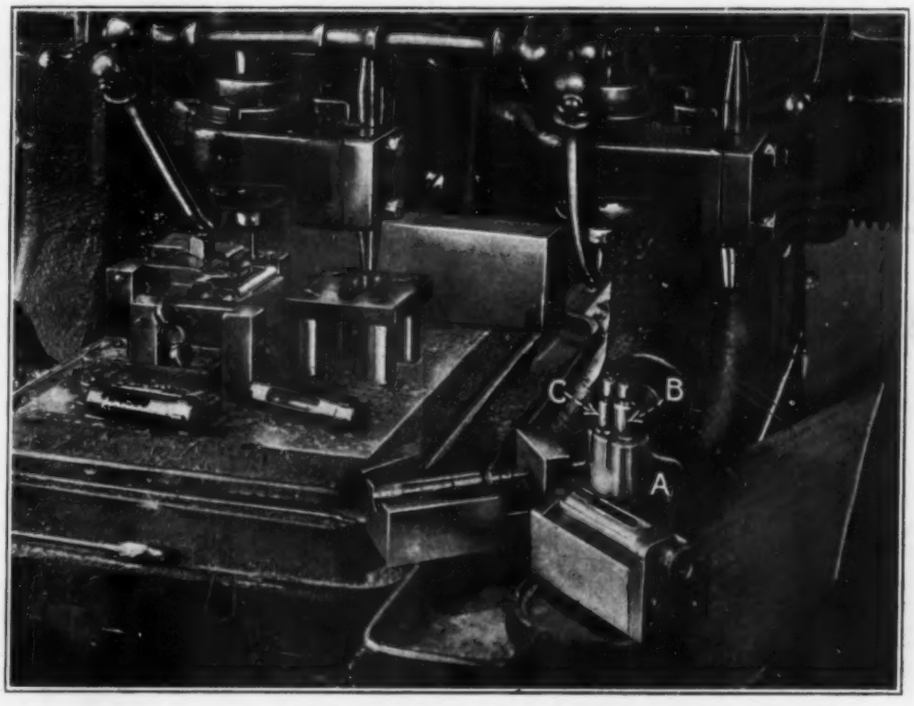


FIG. 92. PROFILING CAM SLOT IN SIDE OF BOLT

Over the Top

Go "over the top" when you do your work,
And as you go over cheer;
Somewhere in France is the first-line trench,
But the work-line trench is here.
Back up Sammy with all your might,
And Sammy is bound to gain;
Stand by your tools till the fight is o'er,
Drill and turn and plane.

Go "over the top" with a smiling face—
A curse on the man who whines;
Cannon and bullets are what we need
For strafing the German lines.
Get into the fight somehow today;
Handle a tool or a gun;
Do a little bit more than your very best
If you're trying to halt the Hun.

Go "over the top" with all your might;
Be thankful you've skill to give;
For work is an easy price to pay
That Freedom and Right may live.
Don't be a laggard, don't pick your way,
Go "over the top" with a yell,
And give a boost to the brawny boys
Who are giving our enemy hell.

—Adapted from *New Departure News.*

SIDELIGHTS

EDITED BY E. C. PORTER

An interesting form of welding aluminum and copper wires together is that practised by the Westinghouse Electric and Manufacturing Co. The copper wire and the aluminum wire to be welded together are "blown" together by an electric discharge which produces a weld that can be rolled into a thin coil with no appearance of either copper or aluminum. The "weld" is so strong that the wire will always break somewhere else than at the weld, although it is thought the weld is composed of an alloy of copper and aluminum that is quite brittle.

* * *

F. G. Kellaway, Parliamentary Secretary to the Minister of Munitions, in a speech dealing with the output of munitions for the British Army, said the increases for the first two months of the year, compared with the first two months of 1917, were: Light guns, 30 per cent.; medium guns, 57 per cent.; heavy guns, 38 per cent.; machine guns, 96 per cent.; shells, 83 per cent.; tanks, 39 per cent.; airplanes, 223 per cent.; aero engines, 245 per cent. The average weekly production of airplanes, he said, equaled the average production for two months in 1915, while one week's production of machine guns equaled that of five months in 1915.

* * *

The Manager of Inland Traffic, War Industries Board, Washington, D. C., has issued an application blank known as P. T. Form No. 1 for anyone desiring transportation assistance. A number of questions with blanks are given for the shipper to fill in. The application is then sworn to before a notary public and signed by the applicant for transportation assistance. A note on the blank says that before requests for assistance in securing transportation is made to the board the usual means of obtaining transportation should be exhausted by shipper and consignee.

* * *

Director General McAdoo, realizing that the payment of the full railroad fare means a serious hardship to our soldiers and sailors who desire to visit their homes before going overseas, has ordered that as soon as necessary details can be completed soldiers and sailors of the United States forces when furloughed and traveling at their own expense will be granted a rate of approximately one cent a mile. This fare will be available on delivery to ticket agents of certificates signed by commanding officers. Such certificates of standard form will be prepared and distributed with the utmost promptness.

* * *

The recent action of the President in fixing the price of aluminum at 32c. a pound calls attention to the rapid growth of this industry in the United States, which has now become the leading producer of aluminum in the world. A compilation by the National City Bank of New York shows that the production of aluminum in the United States has grown from 60,000 lb. in 1890 to 7,000,000 in 1900 and 180,000,000 in 1917, these figures being in round terms. The value of the product, which amounted to $2,000,000 in 1900, was approximately $46,000,000 in 1917. Exports of aluminum from the United States have grown from $1,047,000 in 1914 to $20,300,000 in 1917.

* * *

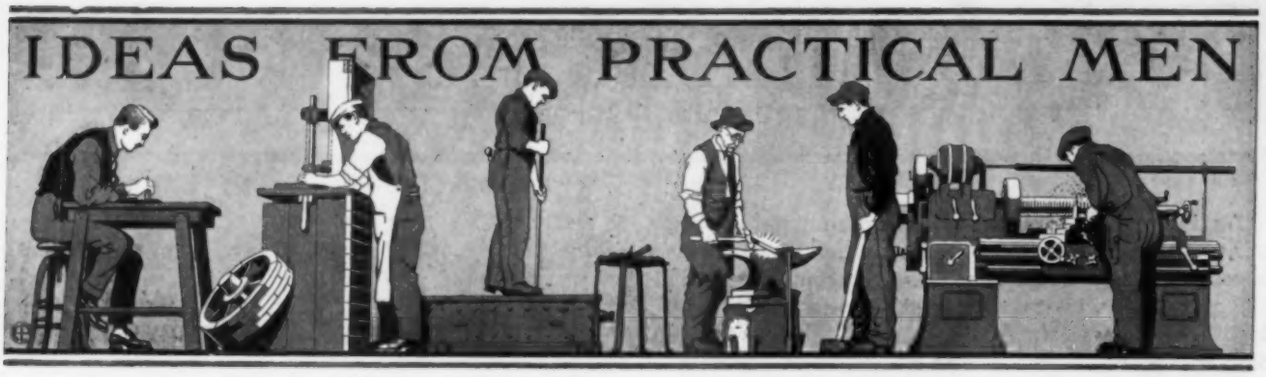
The total pulpwood consumption in the United States during 1917 is estimated by the Forest Service, on the basis of reports made by the pulp mills, at 5,536,802 cords, an increase of approximately 6 per cent. over the 1916 figures. In 1917 domestic spruce formed 45.8 per cent. of the total as against 45.9 per cent. in 1916; imported spruce formed 11.5 per cent. in 1917 and 13.4 per cent. in 1916. Wood-pulp production in 1917 is estimated at 3,464,511 tons as compared with 3,271,310 tons in 1916. The 1917 production included 1,498,704 tons of mechanical pulp, 1,468,396 tons of sulphite pulp, 421,671 tons of soda pulp and 75,740 tons of sulphate pulp.

* * *

President Wilson's appeal to the Boy Scouts of America to help win the war by locating supplies of black-walnut trees has been followed by arrangements under which the War Department, the Forest Service and the Boy Scouts have joined efforts to find the needed timber. As President Wilson pointed out, the War Department program makes the securing of black-walnut lumber for use in manufacturing airplane propellers and gunstocks of the utmost importance. Many thousands of blanks and letters of instructions are being printed by the Government for distribution to scouts and scoutmasters throughout the region in which black walnut occurs in commercial quantities. As reports are turned in by the scoutmasters they will be tabulated by the Forest Service and reported to the War Department.

* * *

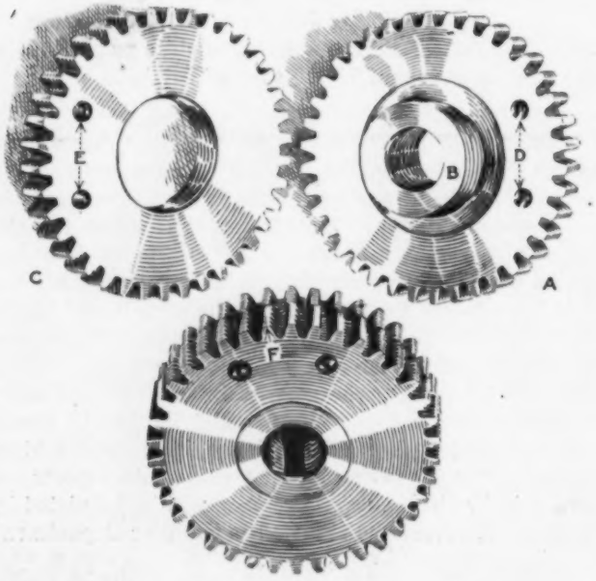
In connection with the black-walnut census which President Wilson has asked the Boy Scouts of America to undertake Henry S. Graves, Chief of the United States Forest Service, has written a letter to the Boy Scouts explaining why the need for the work is urgent. "The tremendous forest resources of the United States," Colonel Graves states, "will undoubtedly be a very important factor in winning the war for the Allies. One of the most essential timbers for war purposes, as the President points out, is the black walnut. With the exception of mahogany, which has to be imported and thus burdens the shipping facilities of the country, no other wood is so well adapted for airplane propellers. Since four or five propellers are required for each airplane, and since black walnut is scarce and only the best grade can be utilized for this purpose, it is important for the Government to know immediately the location of all available supplies. Walnut is also the chief wood used for gunstocks. It has been appropriately called the 'Liberty Tree'."



An Adjustable Gear for Eliminating Backlash

By Philip J. Raab

A gear made in two parts, with one part adjustable in relation to the other, is shown in the illustration. The writer was having trouble with a train of gears on a grinding machine, the gear teeth wearing down



ADJUSTABLE GEAR

quickly, owing to the presence of loose emery, and becoming very noisy. As a means of overcoming this difficulty, this gear was devised.

Part *A* is made one-half the thickness of the required gear with hub *B*, the length of which is equal to the full thickness. This hub is threaded on its outer diameter and part *C*, also one-half the gear thickness, nicely fitted to it. Two conical seats *D* are machined in part *A* and two corresponding conical-pointed setscrews *E* tapped into part *C*. The center distance of the seats *D* is, however, greater than the corresponding distance *E* by an amount equal to nearly one-half the diameter of one setscrew. The parts are screwed tightly together, in which position one of the screws should come into alignment with its seat, and this screw is tightened. The other screw is now set down as far as it will go, but it will of course bear upon one side of its seat. With the parts in this relation the teeth are cut on the gear.

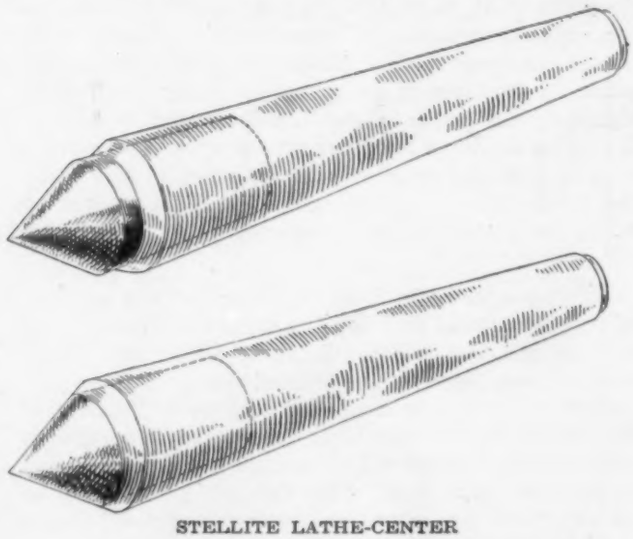
Now by loosening the first screw a trifle and tightening the other the parts of the gear are turned slightly in relation to each other, as shown at *F* in the assembled drawing, adjusting the gear so that one-half drives in one direction and the other half drives in the reverse direction, thereby eliminating the backlash.

Improved Lathe Centers

By G. E. Lussier

In line with E. N. Moor's improved lathe center, on page 296, Vol. 48, of *American Machinist*, in which he utilizes high-speed steel inserts for the bearing surface, I would mention that excellent results are being derived from the use of Stellite tips. Some of our work is on heavy forgings and we have had difficulty with burned centers.

The center shown has done away with this burning and there is little or no "ringing." Stellite has heat-



STELLITE LATHE-CENTER

resisting qualities superior to the best of high-speed steels. It is brittle, but with ordinary care this characteristic is not a hindrance.

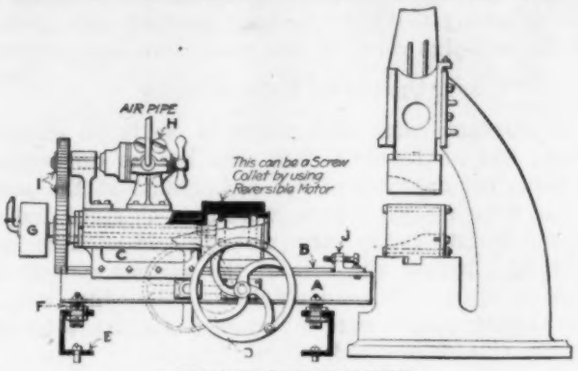
The base of the tip is ground so that a good shrink fit will result when inserted into the shank. Any sized tip can be made, but one fitting a $\frac{3}{4}$-in. hole $\frac{3}{4}$ in. deep has given us satisfaction. The tip can be made to protrude $\frac{1}{16}$ in. or it can be finished flush. In case of the protruding tip the work will always be away from the carbon steel. Where oil is to be used a groove extending to the point is ground on the face.

Fixture for Nosing Shells

By G. Barrett

I inclose a sketch of a fixture for nosing large shells on a Beaudry hammer. Quite a number of munition works have discarded the hammer for a press on account of the difficulty of feeding the shell into the dies and revolving it uniformly at the same time.

The arrangement, as shown, has been used on about 80,000 6-in. shells and has proved very satisfactory, especially on the inside profile. It is constructed from two pieces of channel iron *A*, with cast-iron slides *B* for carriage *C* to move on. The carriage is operated by the handwheel *D*.



FIXTURE AND HAMMER

The legs *E* are of box type and are provided with adjusting screws and collars *F* for aligning the fixture with the dies in the hammer. After being heated the shell is placed in an air chuck operated by the air cylinder *G* and revolved by the air motor *H*, which is geared down as shown at *I*.

The carriage is moved along so that the shell enters the dies and feeds in till it touches the adjusting stop *J*, which is set according to the length of the shells being made. The dies are made from steel castings and are ground and pack hardened. The production from this fixture is an average of 40 shells per hour.

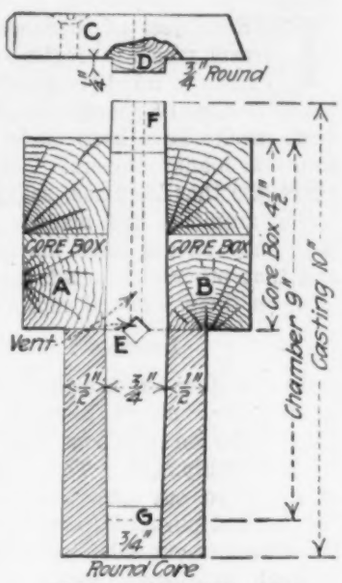
Casting a Water-Jacket Ring

By M. E. Duggan

A casting was required for a hollow ring or shell to be used as a water jacket. The ring was to be about 26 in. outside diameter, 24 in. inside diameter and 10 in. in length or depth. This ring was to have within its walls an annular chamber about ¾ in. wide and extending nearly the length of the ring. In other words the chamber was to be completely surrounded by metal approximately ½ in. thick on all sides, with no opening of any kind.

As it was impossible, according to my limited knowledge, to produce a casting to these specifications, I was confronted by the necessity of turning down the job or "taking a chance," and this latter is at times a somewhat hazardous proposition. For instance, some time ago my employer got an order for a cast-iron tank to hold gasoline under pressure. I had not much confidence in cast iron as a material for this purpose, but I took a chance. The tank leaked; Rosenbaum got the casting; the collector got the bill, and I got the can.

In the illustration is shown my method of doing the job, which while it enables the molder to produce a casting that should answer the purpose does not conform to the specifications that there shall be no openings to the chamber. I shall indeed be very grateful to anyone who will show me a way in which this latter requirement can be met. For the sake of simplicity this sketch shows only a section of casting, core and (in the upper half) the core box, which consists of two rings *A* and *B*, one within the other, spaced the right distance apart by six blocks *C* having a round projecting boss *D*. The box thus formed is 4½ in. deep and makes one-half of the core. Around the joint face is a groove, as shown at *E*, and vent holes connecting with this groove pass through the upper half of the core through the round cores *F* and out of the mold. Round cores *G* are provided to support the chamber core while the mold is being poured, these cores fitting the depressions formed in the chamber core by the projecting bosses *D*.



CORE, CORE BOX AND PART OF CASTING

These supporting cores rest on small slab cores rammed up in the mold, there being no core prints of any kind. The twelve ¾-in. holes left in the casting by the small cores were tapped and plugged.

Belgian Coöperative Buying Society

In view of the critical situation resulting in Belgium from the disasters caused by the depredation of the enemy, his removing of tools, raw materials, manufactured products, etc., there has been formed with the coöperation of and under the control of the Belgian state an organization having for its object the economic reconstruction of Belgium under the name of "Comptoir National pour la Réprise de l'Activité Économique en Belgique" (Société Coopérative), 15 Rue Louis le Grand, Paris (2°).

This organization, in helping industry and trade by enabling them to purchase the tools and all necessary raw materials, will not only reconstruct the economic situation of Belgium, but will put an end to the sufferings of the working classes by enabling them to begin working in the reconstructed shops.

American manufacturers will at once see the importance of this organization, and they are asked to send catalogs and literature in triplicate. Everything is of interest, as everything has to be set up again—metallurgy, materials for the construction of buildings, leathers, textiles, farming implements, chemical products, wood machines, electrical material, optical instruments, motor cars, vans, wagons, oils and greases of all kinds, refractory materials, etc.

Little Chance for Profiteering in the Ordnance Department

By PAUL ALLEN MacKENZIE

THE subject of profiteering in Government contracts, which is creating much comment at present, brings to mind the report of the British Committee on National Expenditures, which discloses that enormous profits have been made in Great Britain by the munition manufacturers. The committee found in the aggregate that 26 firms, selected at random, manufacturing munition had made a profit five times greater than they should have made based on normal times and that others had made profits as high as 341 per cent. on their invested capital.

Letting Large Contracts

On the other hand, technical investigations conducted by the Government have resulted in the saving of £35,000,000 on gun ammunition alone and £2,000,000 on gun equipment. This statement naturally draws attention to our own huge expenditure; but due to the method pursued in placing munition contracts by the Procurement Division under the direction of Col. Samuel McRoberts, such a condition as prevails in Great Britain can never be paralleled here.

At the beginning of the war it was necessary for the Ordnance Department to order raw materials and equipment on a scale heretofore unprecedented in the history of the world. A large part of this material had never been manufactured in this country and was in nowise a standard product. Very large contracts were let with no knowledge of the manufacturing cost or methods of producing the materials and even thorough understanding of the design needed was not at hand. For this reason it was necessary to enter into a form of contract known as the cost-plus.

The manufacturers were not willing to undertake the production of these articles at the flat price which the contracting officers of the Ordnance Department would accept. Naturally, due to the quantity, a small variation in the unit price of the article would involve millions of dollars, and contractors could not take chances of bidding on this work as on ordinary commercial products.

Price Unsatisfactory

Much ordnance material similar to that produced for the Allies was to be contracted for. The United States Government, however, was not willing to pay the price allowed by the Allies on this material and this was another reason why the cost-plus contract became necessary.

In many instances speed was the essential item, and, as is well known, speed often means uneconomical methods of manufacture, and companies could not afford to produce articles at a normal cost where speed was so essential. Often the exact design was not decided upon, but it was urgent that work be started at once. With the cost-plus contract these designs could be changed when necessary and production begun in the shortest possible time.

It was realized by the contracting officer that cost-plus contracts might be subject to extravagant expenditure if all items of cost were not carefully checked by the Government. The checking of the cost and methods in the small-arms rifle plants is outlined in the following to illustrate how carefully this feature of the cost-plus contract was taken into consideration.

Verifying Expenditures

Accountants were first placed to verify all expenditures, and no invoices were paid by the Government without the approval of the accountants at the plant. Manufacturing-cost experts were then obtained and assigned to duty at the various plants, and methods were outlined whereby the cost of the various components making up a rifle were obtained. Thus the costs at the various plants were ascertained and the total cost of the rifle determined.

The wages paid to the various classes of labor at the rifle plants are carefully checked. A weekly report is received in Washington from each of the three plants making rifles, detailing the wages paid all classes of labor and the average weekly wage paid. For the week ended May 11 the average weekly wage was $25.22. This included all employees from the unskilled laborer to the general superintendent.

The amount of scrap is reported weekly and manufacturing methods investigated in order to reduce it. It is believed that the scrap in the rifle plants is lower than in most manufacturing institutions operating on a similar class of work.

Approving the Material

The same methods are used in checking the tool cost of the rifle. All material purchased for the manufacture of rifles must be approved before the contract is placed. The price paid for this material cannot exceed that accepted by the War Industries Board and agreed to by the steel manufacturers and approved by the President.

Overhead, or nonproductive, labor cost is carefully checked in order to keep it at a minimum figure.

In order to check all manufacturing methods in use on the various components at the rifle plants, a system of methods-inspection work was instituted, and experts in manufacturing were stationed at the plants. Detail studies of the operations on each component are submitted to Washington with recommendations made by the methods inspectors. The methods used and the recommendations are compared, and where it is shown a saving can be made the rifle companies are instructed to make the necessary changes.

As an illustration we will take the butt-plate spring, which is a very small item in the production of the military rifle. The officer detailed by the Procurement Division of the Ordnance Department to a plant makes a detailed report as follows: A blueprint is shown giving the dimensions of the finished spring, followed by a list of all the operations through which this small part is to go before being assembled in the rifle. There

are nine operations, including annealing, stamping, reaming out the screw holes, tempering the spring and testing and stiffening, etc.

Then follows a specification of the analysis and quality of the steel used in this item, after which comes a concise report of the method pursued in performing the nine operations necessary to its finish. Blueprints of the stamping machinery necessary to produce the article are shown in detail, followed by the cost of machinery, the estimated wear on machinery, the average output per man, the cost per hour for labor, and a summary of the above and the actual cost of the finished part.

By this method, savings in the neighborhood of $500,000 have been effected.

Fair Price for Rifles

When the placing of rifle contracts were first under discussion at the commencement of the war the companies considered $35 to $40 each a fair price for rifles. They had undertaken to manufacture them at the flat price of $30 for the British government, but each of the three companies so engaged had to give up its contract, with the consequent loss of millions of dollars, as no profit could be made at this price. It was therefore reasonable to assume that they must now receive $35 to $40 in order to make a profit on rifles. At the present time it is costing about $22 to make a rifle. This is manufacturing cost, and does not include Government-inspection expenses or War Department overhead, and it must be remembered that these rifles are a great improvement over the similar British weapon and are much better finished.

If the contracts with the manufacturer had been entered into at a minimum price of $35, this would mean that the rifles would be costing us $13 more than at present. On 1,000,000 rifles this would amount to $13,000,000.

Loading Artillery Ammunition

In regard to the loading of artillery ammunition it is well known that this country had been manufacturing explosives and shells for the Allies for a long time before it entered the war, but practically no loading or assembling of the complete shells had been done except by a few firms who had done this kind of work to some extent for the Russian and French governments on small-sized shells.

Virtually it was a new art in the United States, and in most cases factories had to be built for this work. The Government buys the shell casings, fuses, boosters and explosives from their respective makers and ships them to the loading plants to be assembled, but owing to the traffic conditions that prevailed last winter, supplies were long overdue when received at the loading plants. If one part is missing, of course, the entire work is held up and the output is small; and indicative of the low margin of profit at which the contracts were placed it may be stated that because of the delay in receiving the component parts the books of the contractors showed a debit rather than a profit up to the first of March.

While the cost-plus contract is no doubt open to criticism, in most cases it is the most economical and decidedly the most fair in the present emergency.

Status of American Aircraft Production

In his first speech since the recent reorganization of the Aircraft Board, Howard E. Coffin gives an encouraging view of the present aircraft situation in this country. Mr. Coffin's speech, extracts of which are here given, was made at the semiannual meeting of the Society of Automotive Engineers held June 17-18 at Dayton, Ohio.

There is one phase of aircraft work of which nothing has been seen here today, but to which the Aircraft Board's advisory relations were just the same as to the army's activities. I refer to that of the navy. The navy has been building battleships and destroyers and telling us about how submarines have been sunk, but we have not heard a word about aircraft, and yet in many ways the navy has done the most remarkable work in that respect. It is flying every day aircraft weighing up to 12,000 lb. equipped with engines of from 400 to 1000 hp., and carrying crews of five men. Commander Colburn has just told me that within the last week two of these Liberty engines were taken from stock, put into a stock boat, flown up and down the river a couple of times to make sure that everything was all right, and then a trip was made of some 280 miles, from Philadelphia to Newport News, without missing a "shot" on either engine. I have seen them doing this sort of thing right along and they think nothing at all of it. They are making almost daily trips from Newport News to Washington.

What Will the Limit Be?

When we consider the size of these boats and the power being put into them, we wonder just what the limit in aircraft development will be. Of course, the army is also at work on large machines, but the navy, because of its work in detecting submarines, has started immediately with the large sizes. The new naval-aircraft factory at Philadelphia has a floor space of about three-quarters of a million feet, and the work being done there is something that every one ought to see. All of us, I think, today have seen enough of an exhibition of flying to know that the building of fighting machines is in good shape.

It has only been a few weeks since some of our friends were talking about one airplane that had cost $640,000,000. Part of the press seized upon the expression as a headline and some of us have seen cartoons with the $640,000,000 in one-half of the scale and one poor little airplane in the other half. As a matter of fact only about a half of the appropriation made for aircraft has actually been spent. Every dollar of that amount has been accounted for, of course, through the accounting system of the War Department. Some five or six thousand training machines have been built and a couple of thousand machines perhaps in Europe. Construction for Europe has been delayed because of the unsettled conditions over there, owing to the drives in Italy and the west front and to the shortage of materials.

Some 150,000 men are in training in the aviation service in this country, and there are twenty-five or thirty of the big training stations in operation. A laboratory in operation here in Dayton is one of the most remarkable developments of the whole air service and, perhaps most important of all, the mystery of aircraft production has been thoroughly exploded.

Plants in this country are producing and others will produce aircraft of standardized interchangeable designs nearly as freely and easily as American plants have ever built automobiles. Those who visit the Dayton Wright plant will see a fine example of this work of interchangeability of parts. Airplanes are being shipped from this country in a disassembled form without markings. The crates, when received on the other side, can be opened and the parts assembled without any regard to the building operation on this side, and as I remember a cable received only a few days ago stated that within a few hours of the receipt of a certain shipment upon the other side, planes were assembled and the engines running.

That is the way in which America will build airplanes. It has taken time to build and the tools and the fixtures that

have made it possible to manufacture interchangeable parts. S. A. E. members with their knowledge of manufacturing and repair problems will realize what engine construction and airplane construction mean when it comes to keeping these machines in operation at the front, because no matter how many airplanes we ship to Europe if the interchangeable repair parts are not there and the men skilled in maintenance are not on hand the machines will do us little good. We have heard a great deal said about the possible time lost in developing an American engine when it was seemingly perfectly simple and easy to adopt foreign engines, bring them to this country and put them in production; but if anyone will show me an institution in this country that has adopted a foreign engine and put it into production in less than from one to two years then I will grant the argument to have some force. I might ask Mr. Houston to tell you something about the Wright-Martin experience. I think an order for engines for the French government was a year behind the estimate in delivery—a year behind the specified delivery, although the drawings, the engineers and the sample engines were all brought to this country at the same time. The General Vehicle Co. might tell a story about the Gnome experience, and I know that the treasurer of the American Locomotive Works can tell a sad story about the Berliet.

Those who have seen the engine exhibit in the pavilion realize perhaps some of the reasons for hesitation in adopting certain engines when the great point was speed and quantity in production. After analyzing the situation and past experience from start to finish it was decided that with American engineers working in the American way and with American machine-tool designers working with these engineers results could be got months earlier than if foreign engines were put into production in this country. I think it is a fact that can be borne out by any representative of the British service that after three years of war, with some ten thousand men in the main works, the leading British company is producing 50 engines a week, each developing 50 hp. less and weighing 100 lb. more than the Liberty. Now that gives a little insight into some of the arguments leading to the design and putting into production of the Liberty engine. It is America's purpose to build engines not only for our navy and our army, but for foreign countries as well. There is a great difference between 50 engines a week and from 50 to 100 engines a day, an output any one of half a dozen plants of this country plan to produce within the next 90 to 120 days.

Creating a New Industry

Leaving aside all such accomplishments as increasing the spruce and fir production to some 15,000,000 ft. a month, the construction of the flying fields, the building up of personnel—and remember this entire proposition started from minus zero last July—leaving aside all of the accomplishments in the building of plants for the production of chemicals, in building up industries for the production of accessories, those who have seen the planes on exhibition and who will see them at the Dayton Wright plant will learn that the engine and the airplane are perhaps the simplest parts of the job. The wireless, wireless telephone, bomb-dropping apparatus, oxygen tanks for breathing at high altitudes, electrically heated clothing, generators, flares for landing at night, scientific instruments for recording speed, altitude, inclination, synchronized machine guns and half a dozen other things, practically none of these were produced in this country a year ago. An industry has had to be created in almost every instance. Just leave aside all these matters and perhaps three major things have been done. One of them is the development of the Liberty engine. When I say development of the Liberty engine I mean, as Major Vincent told us in January, the production of a Liberty cylinder which would be so perfect that it might go through the war without change and which could be used in any number or combination of cylinders on such engines as it might be decided to build. Let us call the Liberty engine one accomplishment.

We have heard a good deal lately about the Irish situation in England and that the linen situation was tied up with it. The English aircraft production depended on this supply. The development in this country of a substitute for linen made of Sea Island long-staple cotton, which in actual test has proved superior to linen, is another of the great influences in the development and participation of aircraft in the war.

A third one is one that we perhaps had to force upon some of our allies. Because of the spruce shortage we insisted that satisfactory aircraft could be built of Douglas fir. By force of necessity our allies were obliged to begin using Douglas fir. The latest experiments have shown that Douglas fir is not only the equal of spruce but is probably its superior.

It has been an unfortunate handicap to the air services from the beginning that the matters of censorship have been so exercised that the truth of the difficulties and accomplishments could not be told. This very fact, I think, has been largely responsible for most of the exaggerated stories that have certainly been contributing causes to the misunderstanding of the situation now existing.

I am sure that all of us who have enjoyed the hospitality of the Dayton engineers feel that we can congratulate them not only upon the style of entertainment which they have afforded us, but on the very real accomplishments which they have shown us and which will go a long way toward showing our friends on the other side that America is taking her place beside them in the air, and will go a long way toward helping win the war.

Tempering Thin Snap Gages

By James H. Follen

On a recent large order of snap and angle gages for various gun and gun-carriage parts the company by whom I am employed experienced difficulty in getting the gages through the hardening without warping.

As the number to be made ran into the hundreds, the matter was given much thought, and several kinds of steel was experimented with. A few gages of mild steel were made up and sent out to a hardening concern to be carbonized, but they came back so badly warped that most of them broke in the straightening. The company then decided to do the tempering itself and use Firth sterling special tool steel for all the gages, as these were so light that the cost of material was unimportant when compared with the results gained.

The method used in tempering the gages, some of which were 14 in. long and $\frac{3}{16}$ in. thick, while it may be "old stuff" to some, still worked beautifully and may serve to help others engaged on similar work. We made a shallow pan about 3 in. deep of heavy galvanized iron and placed in this an ordinary surface plate, the pan being considerably larger than the plate, which was, of course, selected to be a little longer and wider than the largest gage. We then filled the pan with good fish oil to about $\frac{1}{2}$ in. above the surface of the plate.

The gages had been first roughed out, annealed and then worked to size. They were heated in a cyanide bath to a medium-cherry red and the hardener simply laid them on the surface of the plate in the oil while his assistant placed over them a plane-surfaced weight fitted with handles so as to be easily handled. When I tell you that some of the gages 14 in. long cleaned up on the surface grinder with the removal of only 0.003 in. stock you will realize how simple and effective is this method.

Slitting saws or any other tools having a uniform thin section can be successfully hardened, and this cheap but effective rig will be an appreciable addition to any hardening or toolroom.

EDITORIALS

Increased Postage Rates

NEW rates of postage on magazines became effective July 1. These increases are material, particularly at distances of more than 300 miles from the place of publication. The obvious step would be to raise the subscription rates in distant zones to cover the added postage.

For the present, however, the publishers of the *American Machinist* have decided not to increase the subscription price, trusting that in the interests of national unity Congress will before long repeal the zone law and revert to the universal flat-rate system. Zone rates on magazines obtained in this country before the Civil War, but were abolished in 1863.

The publishers hope that they will not find it necessary to increase the cost of the paper to its readers.

Our Duty to the War Cripple

THE cripple is not helpless, but capable, provided the right job is found for him and he is trained in preparation for it.

Idleness is the calamity too great to be borne. So what the cripple needs is the chance to work and the encouragement to take advantage of it.

In the past we have done everything possible to make the cripple a failure. We have been lavish with sympathy and charity but short on giving him a real opportunity to make good. The attitude of the public has been a more baffling difficulty than the loss of a limb.

With our new responsibilities to the men disabled in fighting for us in this war we must make our influence a help rather than hindrance. It is no kindness to reduce them to the ignominy of dependence on others, for that makes them "crippled" indeed. We must put them back in the game, make them useful, and in consequence make life well worth living again. Nothing short of this is a square deal to our men.

* * *

There are today many seriously crippled men—some without legs; some even with both arms gone—who are doing their full share in the work of the world. But they had exceptional strength of character to overcome the difficulties placed in their path. With a fair chance many others could do the same. In this light the problem is hopeful rather than discouraging.

The cripple needs thorough training for a trade which he can follow and intelligent placement in employment. These the Government will supply for the returning soldiers, but the responsibility for making this work effective rests with the public.

You can help to make life worth while for our crippled soldiers by showing them real gratitude and respect, but avoiding hero worship or sentimental sympathy; by expecting them to continue doing their duty and encouraging them in the effort; by finding them real jobs which they can hold down—if you are a worker, by seeking out positions in the shop or office which cripples can hold; if an employer, by reserving for cripples jobs they can properly fill not as charity but on the basis of competency alone, and by helping others to a sensible and intelligent view of the matter.

* * *

We cannot now afford to leave in idleness men who can be useful producers. So as good patriots we can start with the cripples now among us and continue the work with the crippled soldiers when they return. We may have cripples in the physical sense, but the moment we get them at a useful job the vital handicap disappears.

Can our crippled men count on you as a real friend?

The Red Cross Institute for Crippled and Disabled Men, 311 Fourth Ave., New York, will gladly send booklets showing what is being done to rehabilitate the cripples of the war.

Rehabilitation of the Maimed Soldier

AFTER the Civil War thousands of maimed soldiers were seen on the streets of our cities. They had been discharged from the army and left to shift for themselves without any attempt having been made to fit them for any kind of work, with the result that in numerous instances they became mendicants. Many of them, it is true, received pensions that were mere pittances, and many that were entitled to pensions had to wait a year or more before their claims were decided because of the slowness of the Pension Bureau. Added to this the burden of identification and proof that his disability was the result of injury received in battle lay upon the soldier, and often this was difficult to prove as his former comrades and officers, on whose testimony he was dependent, were scattered far and wide.

We well remember seeing maimed soldiers wearing the uniform of the United States Army grinding hand organs on the streets, with tin cups for the public to drop coins into. The nation must make it impossible for such pitiable scenes to recur, and one of the ways of doing this is to interest the employers of labor as to how they can help. Other nations have already begun the rehabilitation and vocational training of the maimed.

* * *

Every day brings word that some of our boys "over there" have been killed or injured. For those who gave up their lives we can do nothing except to see that those that were dependent on them shall not want. But the care of the maimed is different. Some will have lost their hands, feet or limbs and some will have lost their sight. Of course every maimed soldier will receive a pension proportionate to his injury. In addition a goodly number are insured, and this is as it should be, but we cannot and must not stop here.

While the country in its gratitude must see that no soldier shall ever want on account of his injury, there must be no pauperizing of him if he can engage in some kind of employment; nor would any self-respecting soldier have it otherwise. If he has no trade he must be taught one, and, having been taught, employment at a living wage, not a pittance, must be given him. There must be no commercialism, no profiteering in the employment of the maimed soldier at small pay. He must be given a chance to earn his living.

The Red Cross, the Y. M. C. A. and various other societies and individuals have taken up the problem and great progress has been made. Ingenious artificial limbs have been devised. Vocational schools have been established and steps taken to fit the maimed for useful employment. And this is proper. But what are the owners of industrial establishments doing?

* * *

Do you, Mr. Manufacturer, realize that you must give some of these maimed soldiers jobs in your establisments, not as a charity, mind you, but as a duty to society and in gratitude for the services they have rendered you and your country? What preparations have you made for this? Have you looked over your shop to see what jobs a man with one arm can do? what jobs a man without legs can do when sitting down? or what job a blind man can do? You are not asked to teach them to do these jobs, but to give employment to men who have already been taught.

If you have not done this, do it now and give the matter your careful consideration. Be ready when the time comes to say I can employ so many one-armed men, so many legless men, so many blind men, etc.

* * *

If you do not think you have any jobs that maimed men can fill ask the Red Cross to make a survey of your shop. It has made many such surveys and has usually sent two men, one a one-armed man, and in going through the works the one-armed man has generally picked out a half dozen or more jobs that he can do and be 100 per cent. efficient.

You bought Liberty bonds, contributed to the Red Cross and were satisfied you had done what was required of you, but your duty was not all done. It had only commenced.

* * *

You will have to buy more Liberty bonds and contribute to the Red Cross again and yet again. The Liberty bonds you bought were not a contribution. They were an investment, a good investment, with the best security on earth back of them and the maimed soldier helped to make that security safe for you. What are you going to do for him?

Loyalty to the Finish

ONE hundred and forty-two years ago this country gave to the world its decision to stand for freedom and for self-government. Today it is fighting side by side with the mother country, with France, with Italy, with Belgium and the rest to preserve that freedom not only for itself but for all the world. Loyalty to an ideal has brought us into the great world war; loyalty to the finish will make it impossible for such a conflict again to occur unless men and nations forget the ideals of liberty and of independence.

* * *

Our boys in France are playing our part over there and playing it well. But we over here, away from the noise of battle, away from the sights of ruined homes and of the untold misery of it all, too often fail to realize the part that is given us to play in this great struggle. We must not tire of our burdens till the whole cause is won—we must be loyal to the finish, in every act and deed.

* * *

Nor is this all. We must realize that there is a great problem confronting us as a nation—the problem of Americanizing the people of foreign birth who now form a goodly portion of our population. And this is not an easy task, for while it is not a new problem it is one about which we know very little. It is not a mechanical problem, of which we can make time studies and plan out distinct operations. It deals entirely with the human element, and must consider racial temperament, traditions, religion, languages and ideals; all of them problems about which most of us know but very little. But if we are to weld the many nationalities into a complete whole; if we are to bring into line all the races as shown in the opposite page, we must give the whole subject very careful consideration.

* * *

There are too many phases to the problem of Americanization to even outline them all in one editorial. But the main thing for us to learn is that every one of us has a part which cannot be delegated to anyone else—the realization that the alien is as human as we are, and that unless we adopt the proper attitude of mind toward him, he can never be loyal to us or to the country. We must get beyond the stage of trying to show, or even to feel, that we are superior in any way. If we really are superior it will show itself in a bigger and broader expression of human brotherhood. And real Americanization cannot be built upon any other lines.

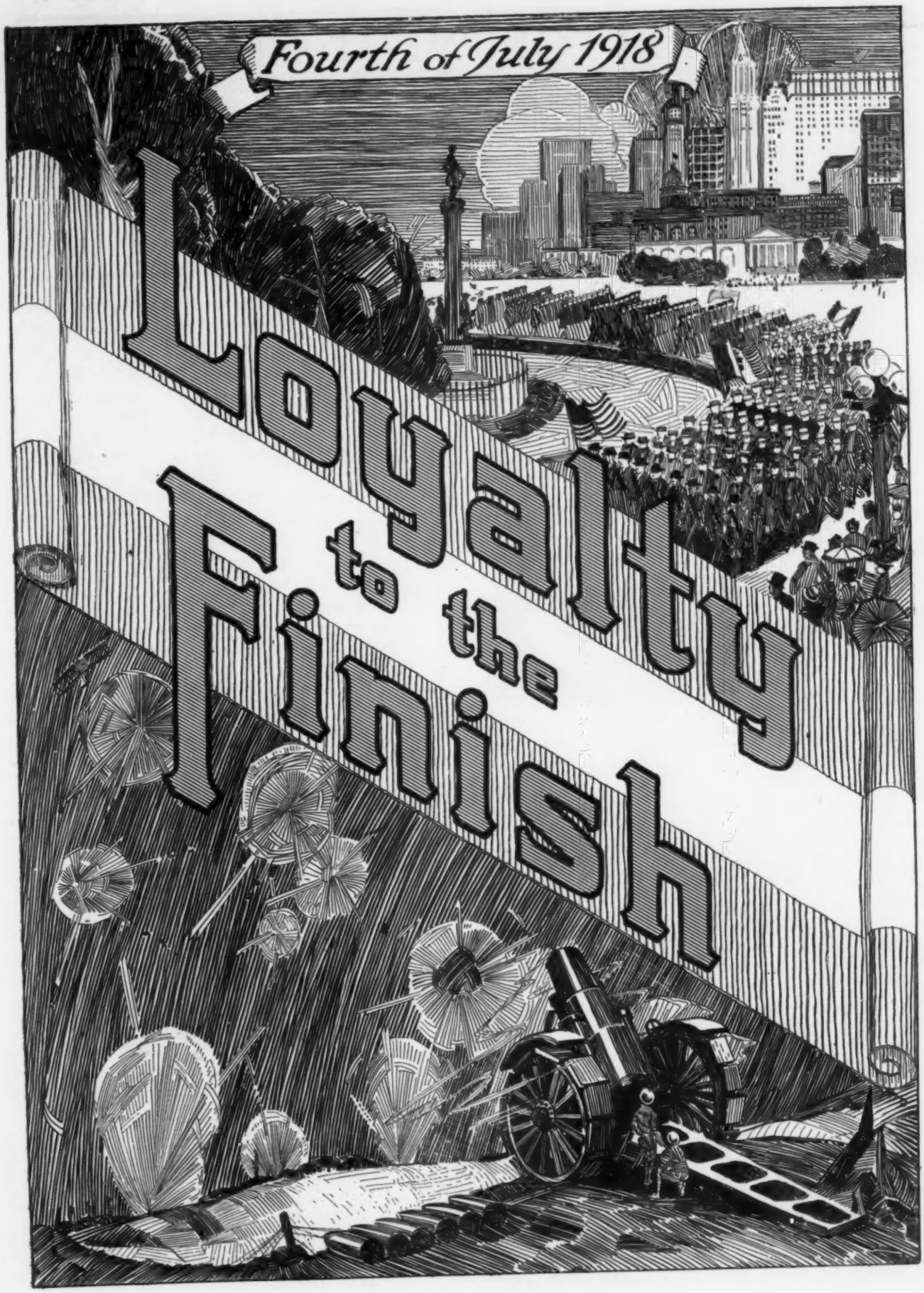
* * *

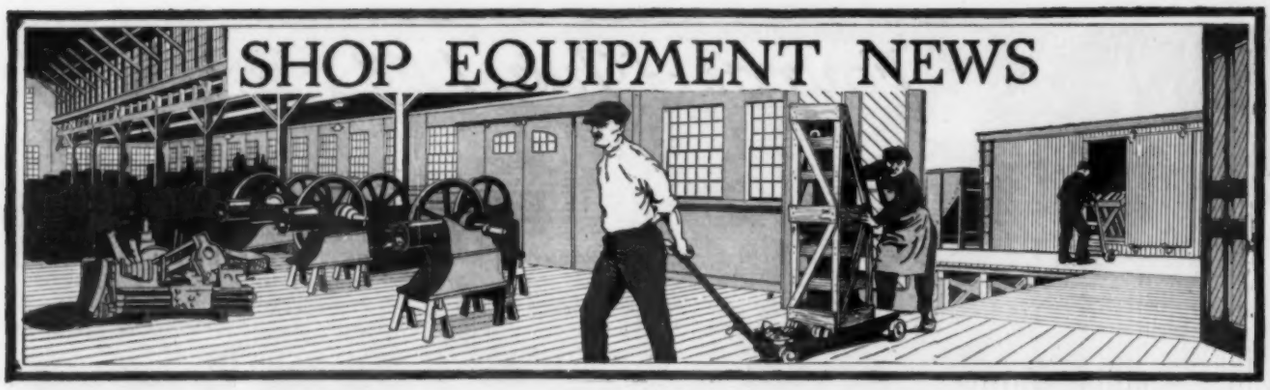
The first step for us all is to realize that no one can be truly loyal to a thing or to a country that does not command his respect by giving him a square deal. In other words we must give the alien something to be loyal to besides high-sounding phrases and Fourth-of-July oratory. It is a personal problem, and we must all do our part in seeing that this great country of ours means as much to the alien in the way of opportunity as it does to us.

We have too long neglected our opportunities for strengthening the ties which bind the alien to our land and to our institutions. We must awake to the necessity of repairing the results of this neglect. We must put ourselves in his shoes and do as we would be done by. There is no other way.

* * *

Loyalty to the finish means that we must do our utmost in the winning of the war. It also means that we must do our part in making this the best country in the world for all who dwell within its borders and who uphold its institutions.

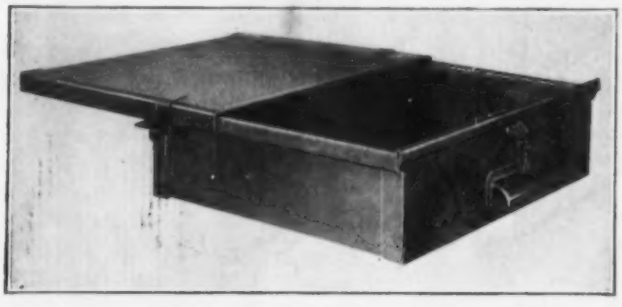

Fourth of July 1918
Loyalty to the Finish



This department is open to all new equipment of interest to shop owners. Photographs and data should be addressed to Editorial Department, "American Machinist"

New Britain All-Steel Bench Drawer

The New Britain Machine Co., New Britain, Conn., is now marketing an all-steel bench drawer, which is shown in the illustration. A hem of triple thickness around the upper edge and the welding of all joints are claimed to produce a drawer of remarkable strength and durability. Another feature is the solid, sheet-metal top, which prevents any tampering at the rear and prevents a blocking or locking of the contents as



NEW BRITAIN ALL-STEEL BENCH DRAWER

is often the case when a drawer is used on a bench having a thinner back plank than the front one, and where an open space is consequently left between the back plank and the top of the drawer. The slide ways are integral with the top and the handle is of such size as to afford a firm hand-hold. A cylinder lock and two keys are provided, and master keying for a set of drawers may be incorporated if desired. The drawer is sold as a unit, requiring no fitting, and can be installed without cutting the bench. The inside dimensions are 18 in. long, 16 in. front to back, and 5 in. deep, while the over-all dimensions are 19 in. long, 16½ in front to back and 5¾ in. deep. Weight in shipping order is 40 pounds.

Oliver Motor-Head Facing Lathe

The illustration shows a self-contained, motor-driven facing lathe that has recently been placed on the market by the Oliver Machinery Co., Grand Rapids, Mich. This machine is known as the company's No. 52-A and is driven by an alternating-current motor. The machine is intended for wood-working operations, is inclosed and claimed to be entirely dust proof. The spindle is made of steel tubing and will accommodate both threaded faceplates and No. 2 Morse taper shanks. The outside end carries a handwheel for holding the spindle for removing faceplates or for turning the spindle by hand when making adjustments. The arrangement is such that if it is desired to turn work on the rear end the handwheel may be removed and replaced by a faceplate. A self-contained controller is incorporated in the machine which gives speeds of from 800 to 3000 r.p.m. The motor is of the single-phase, series-compensated type and will operate on any single or polyphase circuit of the proper voltage and with any frequency from 25 to 60 cycles. The upper cover on the compensator end is removable for internal inspection, and the wiring from the main line to the motor comprises two wires only,

OLIVER ALTERNATING-CURRENT, MOTOR-DRIVEN FACING LATHE

Swing over bracket, 24 in.; swing over rest socket, 20 in.; capacity for work, 20 in. in diameter and 12 in. wide or 24 in. in diameter, 6 in. wide; equipment, 16-in. tool rest with offset rest holder, one right angle rest, one 6-in. and one 12-in. faceplate, and one 2¼-in. screw chuck; diameter of hole through spindle, ¾ in.; taper center, No. 2 Morse; speeds variable, 800 to 3500 r.p.m.; weight crated, 675 lb.

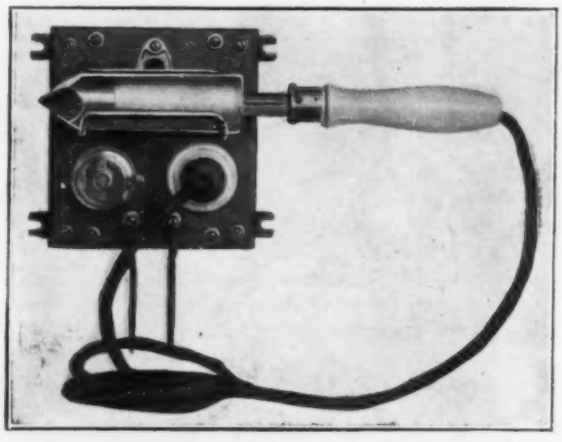
making its connection simple through the avoidance of a number of wires incidental to the use of a regulator or rheostat. Lubrication is by means of grease cups.

The stator frame is constructed of laminated steel reinforced by means of iron spacing blocks which are inserted to absorb the thrust.

This company has manufactured for some time a similar machine for use with direct current. On the direct-current machine the frame is made of soft cast steel and fully incloses all current-carrying parts. The pole pieces are drop-forgings and the field coils are form-wound and thoroughly insulated. The bearings are ring-oiling and adjustable for wear. Hard-drawn copper is used for the commutator bars, which are insulated with mica. The commutator has two brushes per stub, which is claimed to eliminate brush trouble and sparking. The armature is mounted on a shaft which constitutes the headstock spindle and the core is built up of laminations of soft sheet steel. A no-voltage release is provided and the machine has a range of 20 speeds varying from 600 to 3000 revolutions per minute.

Cutler-Hammer Automatic Electric Soldering-Iron Rack

The Cutler-Hammer Manufacturing Co., Milwaukee, Wis., and 144th St. and Southern Boulevard, New York City, has recently placed on the market the automatic

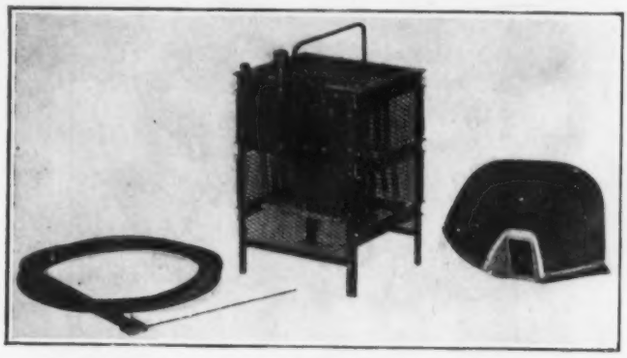


AUTOMATIC RACK FOR ELECTRIC SOLDERING IRONS

rack for supporting and protecting electric soldering irons shown in the illustration. The device is so arranged that when the iron is not in use and is placed on the rack, which operates in a similar manner to the hook for a telephone receiver, a resistance mounted on the back of the panel is inserted in the circuit of the iron. This reduces the current and not only saves current but prevents the iron from overheating and from burnouts. Another valuable feature is that the iron is kept hot and ready for instant use. The panel is fitted with a push-button snap switch for shutting off the current and with a standard receptable to which the plug of the soldering-iron cord is connected.

Electric Railway Improvement Co.'s Welding Apparatus

The Electric Railway Improvement Co., Cleveland, Ohio, is now marketing the "Erico" portable electric-welding outfit illustrated. This apparatus does not require any special power plant, but may be connected to any 110- or 220-volt system in use in the shop for light or power. Its weight is such that it can be picked up in one hand and carried anywhere in the shop. The welding is done in the same way as with other types of welding machines, and the regulation of the necessary current is within the reach of the operator while at work. The apparatus is made in two sizes, the one shown being

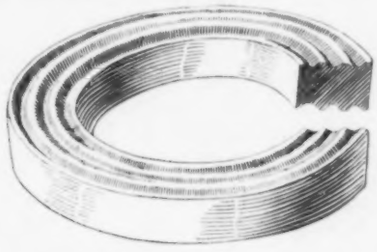


"ERICO" PORTABLE ARC-WELDING OUTFIT

for 150 amp. and 110 volts. The device weighs 16½ lb. without the leads and its over-all dimensions are 20½ x 15 x 12 in. The current can be regulated from 15 to 150 amp. in steps of 15 amp. The second outfit is for 150 amp. and 220 volts and weighs 22 lb., the over-all dimensions being 20½ x 19½ x 12 in. Outfits can also be supplied for greater current if desired.

"Red Devil" Corrugated Lock Washers

The Smith & Hemenway Co., Inc., 261 Broadway, New York City, has recently placed on the market a line of corrugated lock washers as illustrated. The washers are made of manganese steel, oil tempered, and



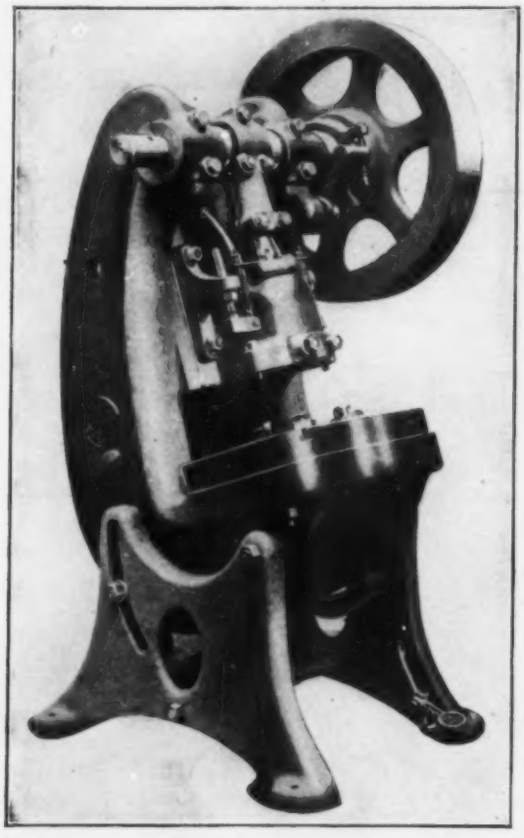
CORRUGATED LOCK WASHER

are put out in a large number of sizes. The advantage claimed for this type of lock washer is that the corrugations give six points of contact which make the device hold better than the ordinary flat type. It is also claimed that it requires 1¼ turns of the nut to loosen a corrugated washer, whereas the ordinary type requires but ¾ of a turn to loosen.

Ferracute Presses

The Ferracute Machine Co., Bridgeton, N. J., is placing a new series of single-action presses on the market, the illustration representing the fourth size in the series, the symbol name of the machine being press C14. These presses have the same general characteristics as similar machines previously built by this company, but are heavier and have longer ram bearings. The shaft may be more easily and quickly removed than in other types of such presses. Each shaft cap is clamped to the

frame by two bolts of large size. The pitman strap is removable in separate halves. A new form of ram knockout is also shown, this, however, being omitted unless specially ordered. The press is shown partially inclined, but it may be completely inclined or raised to



FERRACUTE C14 PRESS

Pressure exerted, 35 tons; weight, 4700 lb.; stroke of ram, 2 in.; adjustment of ram, 3 in.; width of opening through back, 17 in.; height of opening through back, 11 in.; throat from center of ram back to frame, 9 in.; height from bed to ram at top of stroke and adjustment, 10¼ in.; diameter of flywheel, 35 in.; width of flywheel, 6 in.; weight of flywheel, 750 lb.; diameter of steel shaft at journals, 3¼ in.; diameter of shaft at crank, 4¼ in.

an upright position by the elevating attachment which is operated at back of the press by a two-handled wrench. Presses of the same size and construction are also built with gearing instead of a flywheel.

Machine for Milling Powder Pockets In Firing-Pin Plugs

The Automatic Engraving and Manufacturing Co., 79 East 130th St., New York, is building a semi-automatic machine designed by its vice president, E. A. Lundvall, for milling the powder pockets in the firing-pin plug of a French-type high-explosive shell which is being manufactured in large quantities in the United States.

This plug, which is shown in Fig. 1, is of brass and the powder pockets are the two semicircular grooves, extending part way around the center hole. These grooves are approximately 0.07 in. wide and 0.15 in. deep.

An end view of the machine is shown in Fig. 2, where it is belted up and in actual service, but with covers and guards removed to show the mechanism. Figs. 3 and 4 show the front and rear views respectively.

The milling cutter is very simple and is quickly made from a piece of drill rod by filing a flat on two sides and giving it the necessary clearance for cutting. It resembles a small flat drill. The cutter runs 20,000 turns per minute and the time consumed by one complete cycle, which mills both slots, is 10 sec. All that is required of the operator is to put the plug in place and trip the starting lever; thus any average boy or girl can by strict

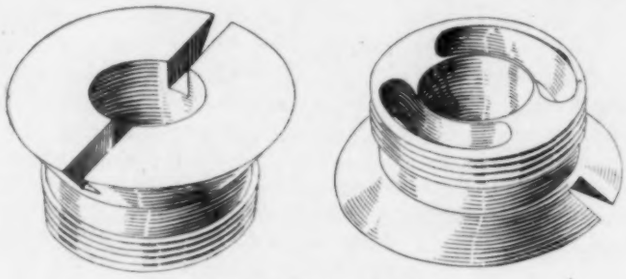


FIG. 1. THE PIECE TO BE MILLED

attention keep three of the machines in practically continuous service.

In the following description, like letters refer to like parts in Figs. 2, 3 and 4.

Referring to Fig. 3, the plug to be milled is placed

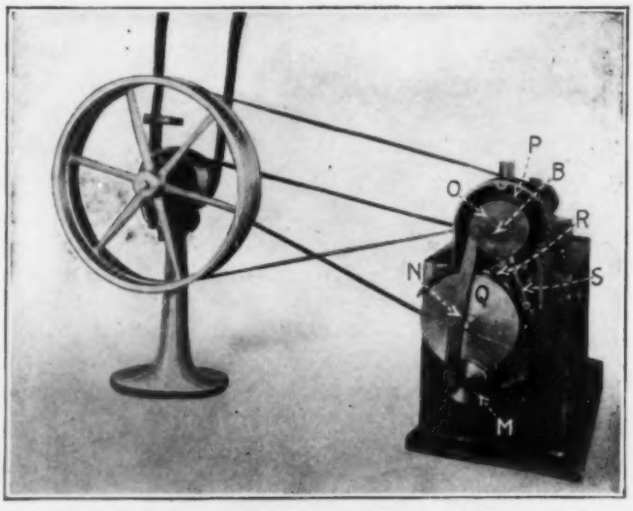


FIG. 2. MACHINE BELTED UP FOR SERVICE

upon the expanding chuck *A*, the wings shown entering the slot in the top of the plug, thus serving to locate the pockets with reference to this slot and also insuring a positive drive. The chuck is tightened by the capstan screw *B* at the left, which actuates the draw rod, or expanding member, of the chuck. The operator then lifts a small lever located under the bench, which shifts the driving belt *C* from the loose to the tight pulley of the countershaft, setting in motion both the milling spindle *D* and the cam movements which perform the operation. The shaft driven by the round belt to the right carries the pinion *E* meshing in the gear *F* which is fitted to turn freely upon the shaft *G*. The hub of this gear forms the driving member of a clutch, the mating member of which is splined to the shaft *G*. The first, or driving, shaft also carries a worm which, meshing with its corresponding wormwheel keyed to the transverse shaft *H*, serves to rotate the latter to which is also keyed the cam *I*.

Referring now to Fig. 4 the cam *J* is loosely mounted

upon the transverse shaft *H* and driven from it by a two-to-one reduction gear, a part of which may be seen in the cut. This cam, through the medium of the levers *K* and *L*, operates the indexing mechanism and also stops the machine at the completion of the cycle. The worm which drives the transverse shaft *H* may be seen in Fig. 4, but the worm wheel, being mounted between

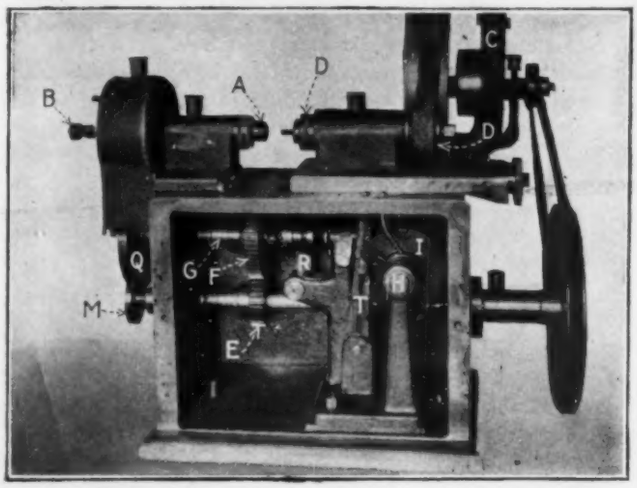


FIG. 3. FRONT VIEW WITH FRONT COVER REMOVED

cams *I*, Fig. 3, and *J*, Fig. 4, cannot be seen in either view.

The work-carrying spindle is double, the inner one being given a rapid semirotary movement corresponding to the length of arc of one of the milled slots by means of the disk *M*, the connecting-rod *N* and the disk *O*.

The outer portion of the spindle may be firmly locked in either of two positions by the index plate *P*, Fig. 2, the latch of which is operated by the lever *L* in Fig. 4. The indexing is accomplished through the large disk *Q*. Fig. 2, and the disk *R* located back of it, which together

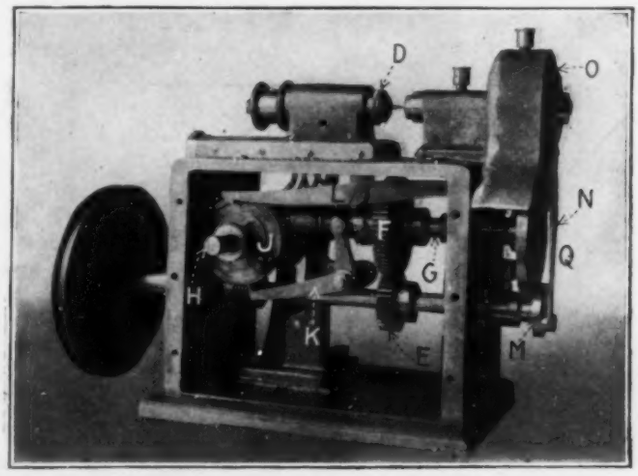


FIG. 4. REAR VIEW WITH BOTH COVERS REMOVED

constitute a modified form of the Geneva movement, which turns the outer spindle through an arc of 180 deg. every time the disk *Q* is allowed to make a complete revolution.

The expanding chuck and driver carrying the work to be milled is clutched either to the inner spindle, which is constantly moving forward and backward through its predetermined arc throughout the cycle, or to the outer spindle which makes a half revolution during each cycle, this clutch being operated through the lever *S*, Fig. 2, and a system of connecting levers, by the cam *J*, Fig 4.

The cycle is as follows: With a plug in place the operator trips the starting lever, after which he is free to attend the next machine. As the shaft driven by the round belt starts to revolve, the cam *I*, Fig 3, through the medium of the lever *T*, advances the milling spindle quickly to cutting position, thence slowly while the cut is being made, and then quickly returns it to the starting point, all of which movements occupy one turn of cam *I*. Cam *J*, Fig. 4, has then made one half turn, at which point it throws in the clutch upon the hub of gear *F*, turning shaft *G* and consequently disk *Q*, Fig 2, one complete revolution.

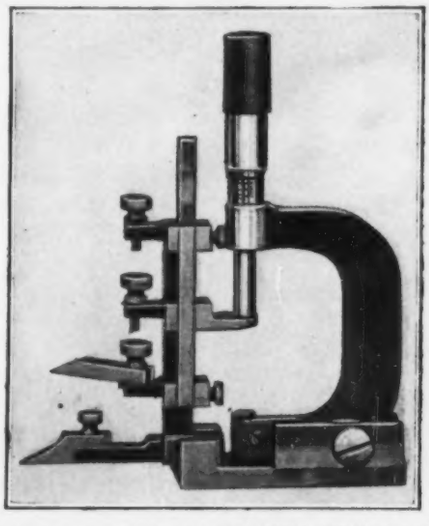
This movement is made almost instantaneously, but during its accomplishment the work carrier has been unlocked from the reciprocating spindle, locked to the outer spindle, turned one-half revolution, disengaged from the outer spindle, and again locked to the inner one.

While this is being done cam *I* is continuously moving, and by the time the indexing is complete the cutter is again ready to enter the work upon the second slot. At the completion of the second turn of cam *I*, cam *J* has made one full turn and stopped the machine.

The depth of the cut can be regulated within close limits by the knurled screw which may be seen at the end of the milling spindle.

Costello Height-Gage Attachment for Micrometer Calipers

The illustration shows a height-gage attachment for micrometer calipers that is being marketed by Henry O. Costello, 91 Raymond St., Providence, R. I. As may



COSTELLO HEIGHT-GAGE ATTACHMENT FOR MICROMETERS

be seen, the device allows an ordinary micrometer to be used on work that is ordinarily in the field of the vernier height gage. The points for measuring may be attached by means of the knurled thumbscrews at various points which are located 1 in. apart, thus allowing the use of one micrometer for readings on parts measuring from 0 to 4 inches.

Grand Rapids Drill-Grinding Machines

The illustrations show two of the new line of drill-grinding machines being placed on the market by the Grand Rapids Grinding Machine Co., Grand Rapids, Mich. These machines are made in two sizes, each being made in both the wet and dry style. The capacity of the smaller machine is from ¼- to 1½-in. drills and the capacity of the large machine is from ¼- to 2½-in. drills. Fig. 1 shows the smaller machine adapted for wet-grinding work, and Fig. 2 shows the larger machine for dry grinding. The spindle is made from 60- to

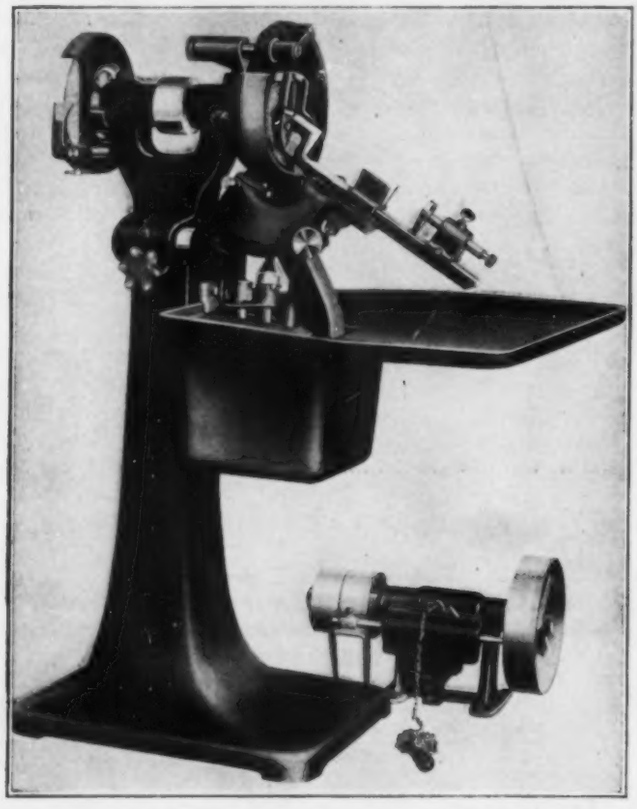


FIG. 1. GRAND RAPIDS B-3-T WET-GRINDING MACHINE
This machine is also made for dry grinding. Spindle speed, 1400 r.p.m.; diameter of grinding wheel, 8½ in.; speed of countershaft, 560 r.p.m.; spindle pulley, 4 x 2¾ in.; driving pulley, 10 x 2¼ in.; tight and loose pulleys, 5 x 2¼ in.; height to center of spindle, 44 in.; floor space, 2 x 3 ft.; diameter of main frame stud, 2¼ in.; swivel bearing, 1¾ x 4¼ in.; net weight 455 lb.

80-point carbon, hammered crucible steel, hardened and ground, and runs in ring-oiled phosphor-bronze bearings, which are adjustable for wear.

The grinding wheels are of relatively small diameter, and the diameter of the flanges on the spindle are made large to give support to the wheel. The swivel is 2¼ in. in diameter, and has a bearing the full width of the column. The holder swivel bearing consists of a cored casting into which a bronze bushing is forced, the whole swiveling on a ground steel stud which is lubricated by means of a grease cup. The drill holder is arranged to take either straight or taper shank drills, and drills with enlarged shanks or drills mounted in quick-change sockets without any changes.

One of the chief features of the machine is claimed to be the lip rest, which is in reality four lip rests in one, as it can be put on to use either edge for the supporting edge, and it can be reversed top for bottom, and in that position can again be reversed so as to give four distinct settings. There is also an up-and-down adjustment to provide for wear. The construction is such that the lip rest cannot be put on wrong, and in case of breakage a duplicate can easily be made by the user. In order to provide for truing the wheel a swinging arm and diamond are provided on each machine for doing this work. In connection with the truing device there is provided a safety stop in the form of a track on a movable section of the wheel hood. As the diamond is advanced into the grinding wheel in the process of truing, the movable section of the wheel hood is advanced an equal amount and always remains a fixed distance from the grinding wheel. A circular stop on the front of the drill holder abuts against the track referred to and rocks thereon in the process of swiveling the holder.

To adjust for clearance all that is necessary is to turn a small handwheel which rocks the holder proper on its swivel bearing. The holder cannot get loose nor slide up and down in its bearing during the process of adjusting clearance. The construction is such that drills of different diameter may be handled, the only adjustment being that necessary to allow for different lengths. The countershaft supplied is of the overhead-

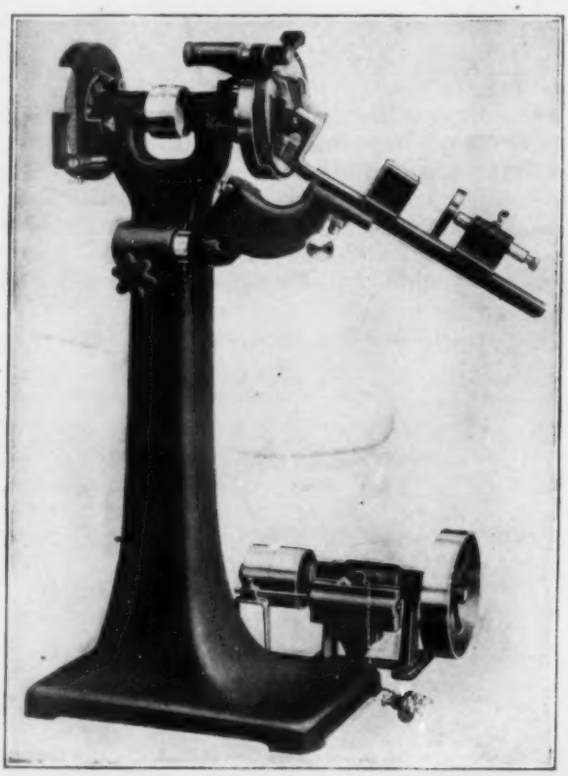


FIG. 2. GRAND RAPIDS C-2-T DRY-GRINDING MACHINE
This machine is also made for wet-grinding work. Spindle speed, 1400 r.p.m.; diameter of grinding wheel, 8½ in.; speed of countershaft, 560 r.p.m.; spindle pulley, 4 x 2¾ in.; driving pulley, 10 x 2¼ in.; tight and loose pulleys, 5 x 2¼ in.; height to center of spindle, 44 in.; floor space, 1¾ x 3 ft.; diameter of main frame stud, 2¼ in.; swivel bearing, 1¾ x 4¼ in.; net weight, 330 lb.

pull type. On the wet-grinding machines the end of the drill is flooded with a stream of water or coolant 1½ in. wide and about ¼ in. deep, which drops directly on the point of the drill. This stream is carried to the special flat nozzle through ¾-in. hose and hoods; water pan and guard are so arranged as to keep water off the machine and floor.

LATEST ADVICES FROM OUR WASHINGTON EDITOR

Washington, D. C., June 29, 1918—Disclosures of large sums paid to middlemen or brokers bring to light a practice that we have mentioned before, but which has been denied in some quarters. No one who has tried to do business in Washington could fail to realize that very little progress was made unless one learned the ropes or employed someone who had. This, however, must not of itself be considered as an evidence of graft in any form. Few of us, even those in fairly close touch with Washington circles, realize the tremendous amount of business to be placed, the size of the organization necessary and the difficulty of handling such a problem.

There should be no need of middlemen, as any manufacturer should be able to lay his facilities for production before someone in authority and secure orders direct as well as through a broker. But we must not forget that we have not eliminated the broker in other lines of activity as yet, and we must not expect too much of an organization which has outgrown all imaginable proportions and is still growing.

The publicity given to this condition is a good thing—as in most cases. If there have been unfair and illegal dealings let them be shown and the offenders punished. It is too much to expect that itching palms will not appear from time to time; but as a result of the investigation it is probable that we shall profit by the exposure of some of the practices which have prevailed, and that a better system of letting contracts will be devised so that the facilities of the country will be more effectively employed.

How It Is Being Handled

It is common knowledge that a number of brokerage and contingency individuals and corporations in Washington, New York and other cities have boldly circularized manufacturers having contracts with the various departments to the effect that they could influence contracts in consideration of commissions running from 2 to 10 per cent. In some cases the manufacturers were informed that they could not deal with the Government except through the individual or firm issuing the circular. It is interesting to note that the Government recently secured the conviction of a contractor who had connived with an officer of the army to procure a Government contract. The contractor was sentenced to five years in the penitentiary and the officer received a 20-year sentence by a court martial. A few examples of this kind, coupled with the widest possible publicity, will have a wholesome effect on the matter of contracts with various branches of the Government.

As a means of breaking up this practice the Attorney General has prepared the following form of covenant, which the President requests shall be inserted in all Government contracts:

> The contractor expressly warrants that he has employed no third person to solicit or obtain this contract in his behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement; and that he has not paid, or promised or agreed to pay, to any third person, in consideration of such procurement, or in compensation for services in connection therewith, any brokerage, commission, or percentage upon the amount receivable by him hereunder; and that he has not, in estimating the contract price demanded by him, included any sum by reason of any such brokerage, commission, or percentage, and that all monies payable to him hereunder are free from obligation to any other person for services rendered, or supposed to have been rendered, in the procurement of this contract. He further agrees that any breach of this warranty shall constitute adequate cause for the annulment of this contract by the United States, and that the United States may retain to its own use from any sums due or to become due thereunder an amount equal to any brokerage, commission, or percentage so paid, or agreed to be paid.

The Labor Turnover and Wages

The question of labor turnover, which has been to a great extent the result of competition among various manufacturers, is receiving official attention, as has been noted in various quarters. This promises to go to the extent of preventing advertising for men except in special cases where permission must be secured from the contracting officer. The United States Employment Service has already begun the taking over of the employment agencies of various kinds in the different states. These restrictions may only be applied to shops of over 100 men.

This means the handling of all labor by the Central Clearing House, which seems to be the only way the problem can be solved. But we must recognize that this will involve such a tremendous task that mistakes will occur and we must be as lenient as possible when poor judgment is displayed.

What Is Nonessential?

The question of essential and nonessential industries is becoming more acute every day and the line is not easy to draw, as what seems essential to one may seem utterly useless to another. One of the moot questions is the so-called pleasure automobile, there being a great

deal of misunderstanding as to what it means. If all cars with a touring or runabout body be classed as pleasure cars, then it is utterly impossible to class them as luxuries or nonessentials, for there are thousands of automobiles that are just as necessary as motor trucks or ambulances.

The luxury cars, however—those used simply to take milady and her pug dog for a ride in the park—might be dispensed with until after the war. Just how many of the regular automobiles are used purely for pleasure would be hard to say, and the owners of such cars must consult their own consciences in regard to their use until there is some governmental ruling on the subject.

So far as the automobile can help to solve the transportation problem it is vitally essential. Beyond that point it enters the luxury class and may expect curtailment.

Machine-Tool Industry

The great importance that is coming to be attached to the machine-tool industry is probably more fully recognized in France and in England than in the United States, and some of the decisions of the governments on the other side are being reflected in our own industry. In France, for example, the machine-tool business has been passing through some rather strenuous times. It is hampered by the lack of shipping space, the difficulty of securing export permits from both the French government and our own as well as the French government's authorization to purchase. Added to this comes the French governmental restriction of the dealers' profits, which are now limited to 15 per cent. of the landed cost of the machine in a French port.

With a normal volume of business this would not be bad, but it is difficult to get French users to place orders for machines that are still in the United States; in fact, it is almost impossible, notwithstanding the machines are urgently needed on the other side. Dealers who had a good-sized stock in France, as a result of liberal stock orders placed last year, are in comparatively good shape, but the rest of them are being rather badly pinched.

The reluctance of users to place orders for machines still in the United States is due to the fact that new equipment is bought only for increasing a manufacturing program, and in order to get contracts from the French government, involving an increased program, the user must agree to certain delivery dates. Inasmuch as he cannot be sure of receiving machines from America within a specified time, he cannot very well consider an equipment that is still in New York or at the factory. The present high prices of American machines are also deterring many customers from placing orders. Freight cost is extremely high, being $180 per ton or for 40 cu.ft., which on a large machine amounts to a small fortune.

District Production Chiefs

As has been previously intimated the production of munitions has been divided into 10 districts, each having a chief as follows: New York, not appointed; Boston, Levi H. Greenwood; Bridgeport, Waldo C. Bryant; Chicago, E. A. Russell; Cincinnati, C. L. Harrison; Cleveland, Samuel C. Scovil; Detroit, Fred J. Robinson; Philadelphia, John C. Jones; Pittsburgh, R. M. Dravo and Rochester, F. S. Noble.

Gen. C. C. Williams, acting Chief of Ordnance, has issued orders that the district chief shall have administrative charge in the various offices, as well as supervision over field work in order to coördinate the efforts of the field forces and the contractors. Each district chief will be responsible directly to the Chief of Ordnance. Under each district chief is an inspection manager, a production manager, a financial manager, a property manager and a personnel manager. In addition to these there is a group of manufacturing specialists, each of whom will give his attention to a particular phase of ordnance production.

The men already appointed are W. W. Coleman, president of the Bucyrus Co., and A. L. Humphrey, president of the Westinghouse Air Brake Co., both of whom will specialize in the supervision of the production of guns and carriages of all sizes and types. They will coordinate the manufacture of the various parts of guns and carriages in the different factories. C. E. Davis will supervise the manufacture of fire control and other optical instruments for the Ordnance Department. J. R. Harbeck, vice president of the American Can Co., will supervise loading plants; this includes those in which fixed ammunition is assembled and loaded as well as those in which the loading of larger shells and the preparation of charging for larger shells are undertaken. J. M. Young, plant manager of the American Can Co., and Herbert Wolff, vice president of the American Car and Foundry Co., will specialize on the machining of shells for mobile artillery. H. H. Blood of the Pratt & Whitney Co. will supervise the production of fuses, boosters and adapters for shells of all kinds. George C. Brainard of the Hydraulic Pressed Steel Co. will specialize on the production of shell forgings.

With a group of such experienced men there can be little doubt as to there being a decided improvement in the production of guns, carriages and ammunition of various kinds, and it is a hopeful sign that men of this caliber are engaged for this kind of work, and the country is to be congratulated on securing their services.

A Working Plan for Settling the Differences in Regard to Labor

It is interesting to note that, as promulgated by General Order No. 29 of the United States Railroad Administration, a working plan for the settling of labor differences has been reached so far as it concerns the operation of the railways now under Government control. These are to be all submitted to a commission known as the Railroad Board of Adjustment No. 2, which is to consist of 12 members, six to be selected by the regional directors and compensated by the railroads, one each to be selected by the chief executive officer of each of the six organizations of employees, which have to do with railroad-shop workers. This board has the authority to empower two or more of its members to conduct hearings and pass upon controversies when properly submitted at any place designated by the board, but such a subdivision of the board is not authorized to make a final decision. This affects the machinist, boilermakers, blacksmiths, railway-car men, sheet-metal workers and electrical workers, but does not extend to the railway trainmen, engineers, firemen or telegraphers. It is hoped that nothing will be allowed to interfere with continuous operation, as that is the vital feature.

A Standard Catalog Size

The desire to select a standard size for catalogs is old, but hitherto it has seemed impossible for the various interests to agree upon a size that would meet the needs of all industries. For the past year the National Association of Purchasing Agents has been endeavoring to determine upon a size which, if adopted, would meet with speedy acceptance by those who issue catalogs, but as it was improbable that any conclusion could be reached by mail the standardization committee of the association concluded that the only successful plan was to get all the interested parties together to talk it over when each could hear the claims of the others. In this way it was believed that differences of opinion could readily be adjusted for the benefit of the nation as a whole and a suitable size decided upon.

Consequently the committee called a national catalog conference at Chicago, May 22, 1918, which was attended by delegates from 23 associations of the industries, the Department of Commerce, the Chamber of Commerce of the United States, as well as a large number of representatives of paper mills, paper jobbers, cover-paper manufacturers, the United Typothetæ, the trade press, printing-machinery manufacturers, catalog printers, filing-device makers and those who issue catalogs.

Everyone was given an opportunity to air his views, at the end of which it was found that in a general way the ideas submitted were brought closer together as one after another agreed to give as well as to take.

After the all-day session of the Catalog Conference the standardization committee of the National Association of Purchasing Agents met and reviewed the arguments and results of the conference. The committee then decided to urge that all catalogs intended for purchasing agents be made 7½ x 10⅝ in. It was also decided that to accommodate those who issue pamphlets and single sheets the following would be adopted for printed matter intended for purchasing agents:

Pamphlets and booklets made in half the standard size will meet the approval of the purchasing agent provided they are saddle stitched so that when opened out they will measure 7½ x 10⅝ in. for convenience in filing. Thus booklets 5$\frac{5}{16}$ x 7½ or 3¾ x 10⅝ will be acceptable.

Single sheets larger than 7½ x 10⅝, such as blueprints, maps and charts, will be filed in the purchasing agent's standard file provided they will readily fold down to that size.

Single sheets or pamphlets of the 7½ x 10⅝ standard size may be folded for convenience in mailing, but should be so made as to permit easy unfolding and filing by the purchasing agent.

The committee also indorsed the recommendation of the conference that paper for catalogs be confined to sizes 25 x 38, 32 x 44 and 33 x 46; that weights based on 25 x 38 be limited to 40, 45, 50, 60, 70 and 80 lb., and that colors be restricted to white and natural.

It is asserted by those who have given thought to the subject that when fully operative this move will conserve 30,000 people now engaged in hand processes because of lack of standardization and will save millions of dollars to the paper and printing industries.

The standardization committee of the Purchasing Agents' Association is as follows: W. L. Chandler, chairman, Dodge Sales and Engineering Co.; W. V. C. Bulkeley, Columbus Railway, Power and Light Co.; C. A. Woodruff, Saxon Motor Car Co.; R. E. Cowan, Ralston Purina Co.; N. L. Morse, Southern California Gas Co.; F. W. Hicks, Prest-O-Lite Co., and G. L. Winters, La Favorite Rubber Manufacturing Co.

Organizing Resources for Improving War Appliances

The War Committee of the Technical Societies has formulated the following statement concerning the ways it believes the technical societies may be of greater service to the country and its conclusions ought to have the support of all practical men.

In order to relieve the production of war appliances from its present handicaps the all-important business of producing them must be completely separated from the work of improving them. Research, invention, designing, testing and development should be handled by a new organization which would take in all the agencies now engaged in such work and in addition would have no less an object than the bringing into coöperation all the technical brains of the country and all the laboratories and plants not required for war production. Only in this way can we liberate production and at the same time meet the new conditions at the front and keep up with the rapid series of improvements which the enemy is continually making.

Accumulated changes in the character of military operations have created a situation which requires prompt attention. It is clear that the physical conditions at the front constitute an engineering problem rather than a military one. This can be solved by bringing into activity the entire engineering resources of the country, and only these resources can create the new methods which must be devised immediately in order to meet these conditions. The task which must be undertaken is entirely different from that of producing standard war appliances, namely, the quick development of new appliances and methods. So far most of the energy of the Government has been absorbed by the difficult work of securing production, and comparatively little attention could be paid to new development. It is now no longer possible to defer this.

Among the main lines of engineering development demanded immediately by the situation described are the following: Tanks; light armor plate and its application to infantry shields, body armor, aircraft, etc.; airplanes; transportation, and mining and handling of materials.

In order to bring the entire engineering resources of the country to bear quickly and effectively upon these problems of improving war devices, the following procedure is necessary: For each class of devices, such for example as that of tanks, the business of improvement should be absolutely separated from that of production and should be handled by a separate organization operating in coördination with the production department and turning over to it the new designs which have been accepted by the army. The organization should be coördinated with the various departments of the army by means of liaison and advisory officers.

Condensed-Clipping Index of Equipment

Clip, paste on 3 x 5-in. cards and file as desired

Wheel Dressers, Nos. 1 and 2

The H. P. Co., 45 Fort St. East, Detroit, Mich.

"American Machinist," June 6, 1918

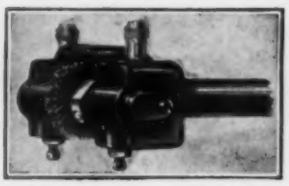
The illustration shows the No. 1 dresser for precision machines. This tool is equipped with dust- and water-proof bearings which allow the complete utilization of the cutters. It is claimed that one new set of cutters will give approximately 1500 dressings. Is equipped with a grease cup and is also provided with a guard to prevent broken cutters or chips from flying into the face of the operator. Is also made in a No. 2 style, which is provided with an extended handle fitting it for more general work. The cutters are 1⅝ in. in diameter by 1-in. face. These two tools are primarily intended to true wheels for rough or semi-finish grinding operations.

Wheel Truer No. 3

The H. P. Co., 45 Fort St. East, Detroit, Mich.

"American Machinist," June 6, 1918

A wheel truer intended for use on wheels employed in finishing work. It is provided with double adjustable bearings and is equipped with a set of cutters of thin metal, and it is claimed that the teeth being sharp and close together give a very smooth, sharp surface to the wheel. This truer is intended for light work only and should not be used where heavy work is being done. It will be noticed that this tool is also provided with a guard which prevents broken cutters or grit from flying into the face of the operator.

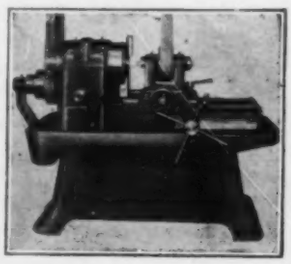


Milling Machine, Thread

Biggs-Waterson Co., Guardian Building, Cleveland, Ohio

"American Machinist," June 6, 1918

This machine is made in two sizes for milling threads on high-explosive shells or other similar work. Three-in. machine: Collet capacity, 3¼ in.; taper in spindle, No. 9 B. & S.; lead screw, 1½ in. diameter, 6 pitch; worm-drive ratio, 100 to 1; width of belt, 3 in.; floor space, 76 x 36 in.; net weight, 3000 lb. Six-in. machine: Collet capacity 6¼ in.; taper in spindle, No. 10 B. & S.; lead screw, 1½ in. diameter, 6 pitch; worm-drive ratio, 100 to 1; width of belt, 3 in.; floor space, 76 x 36 in.; net weight, 3500 lb.

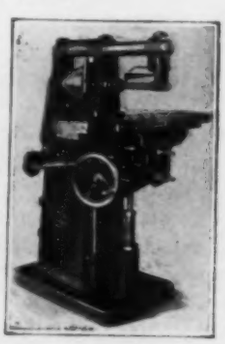


Milling Machine No. 2

Davenport Manufacturing Co., Davenport, Penn.

"American Machinist," June 6, 1918

May be used with hand or power feed as desired. Working surface of table, 36 x 9¼ in. with three ⅝ in. T-slots, longitudinal feed, 22 in.; cross-feed, 6½ in.; vertical feed, 19 in.; diameter of overhanging bar, 3½ in.; distance from bar to center of spindle, 6⅝ in.; diameter of spindle in front bearing, 2¼ in.; diameter of hole through spindle, 1¼ in.; taper hole in spindle, No. 10 B. & S.; spindle speeds, eight, 65 to 367 r.p.m. right hand; feed changes, six, 0.003 to 0.016 in. per spindle revolution; weight 1800 lb.; floor space, 45 x 58 in.

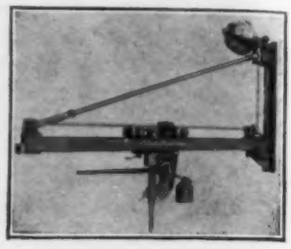


Drilling Machine, Radial Wall

Lynd-Farquhar Co., 419-425 Atlantic Ave., Boston, Mass.

"American Machinist," June 6, 1918

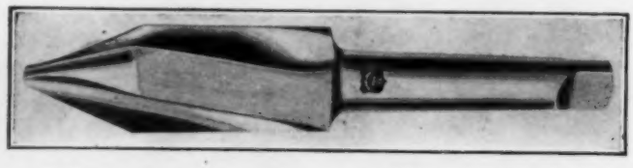
Made in four sizes to drill to the center of a 14-, 18-, 22- or 26-ft. circle with corresponding weights of 3380, 3483, 3615 and 3750 lb.; size of wall bracket, 10 in. wide by 6 ft. 10½ in. high; power feeds, two, 0.015 and 0.025 in. per spindle revolution; diameter of spindle in bearings, 2¾ in.; traverse of spindle, 7 in.; taper hole in spindle, Morse No. 4; pulleys on countershaft, 18 x 4 in.; speed of countershaft, 350 r.p.m.



Countersink for Ship Plates

Standard Tool Co., Cleveland, Ohio

"American Machinist," June 6, 1918



The illustration shows a new countersink that has been recently brought out for special work in countersinking the plates of the new ships that are being built for our merchant-marine service. It is made in two styles, with taper or straight flute, and has three cutting lips. High-speed steel is the material of which the tool is made.

Bending Rolls

Niles-Bement-Pond Co., 111 Broadway, New York City

"American Machinist," June 6, 1918

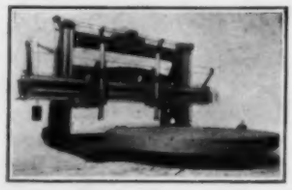
Of the strong-back type with a capacity to roll mild-steel plate 1 in. thick and 36 ft. long or 1¼ in. thick and 30 ft. long. I-beams at the top are 20 in. deep, and four pairs of rollers are used to support each of the three main rolls, the two lower of which are 16 in. in diameter while the upper roller is 19 in. in diameter. The length between journals is 36 ft. 9 in. The rolls are adjusted for height by means of two steel screws operated by a 75-hp. motor through a mechanism so arranged that each end of the roll may be raised or lowered independently or both may be operated together. The operating handles are grouped together and four top braced skip cranes provided one at each corner.

Boring Mill

Niles-Bement-Pond Co., 111 Broadway, New York City

"American Machinist," June 6, 1918

Capacity with housings, front 28 ft. 2 in.; capacity with housings at rear, as illustrated, 42 ft. 4 in.; maximum height under toolholders, 10 ft.; bar travel, 84 in.; motor for table, 60 hp.; motor for cross-rail, 25 hp.; motor for rapid traversing bars and saddle, 15 hp.; motor for traversing housing, 15 hp.; head, on cross-rail, two with octagonal bars 10 in. across the flats; width of cross-rail, 48 in.; depth of cross-rail, 54 in.; table load, 300,000 lb. The table is driven by two forged-steel pinions, one at each side, and the heads on the cross-rail are provided with platforms and operating handles by which all control movements are secured. Push-button control is also used at each side of the machine.



Patent Applied For

Personals

John James Grant is now located in the Singer Building, Room 302, New York.

L. W. Cash, formerly associated with the Racine Manufacturing Co., has joined the E. B. Hayes Machinery Corporation, Oshkosh, Wis., as purchasing agent.

Curtis C. Myers, professor of mechanical engineering in the University of Cincinnati, has accepted a commission as captain in the Army Ordnance Department, and is now stationed at Buffalo, N Y.

H. M. Carroll, for the past three years advertising manager of the Hyatt Roller Bearing Co., Chicago, tractor bearings division, has joined the United States Army and is now stationed at Camp Wheeler, Ga.

Charles E. Hanch, treasurer of the Studebaker Corporation, South Bend, Ind., has been appointed chief of the Automotive Products Section of the War Industries Board. He succeeds **H. L. Horning,** whose resignation was accepted the latter part of May.

James Cunningham has sold out his interest in the Ruemmeli-Dawley Manufacturing Co., St. Louis, Mo., and has resigned his position as superintendent. Mr. Cunningham was with this company nine years. He had previously been master mechanic for several other companies.

Frederick R. Pettit, vice president of the J. I. Case Plow Works, Racine, Wis., has been appointed chairman for Racine and Kenosha counties by August H. Vogel, Milwaukee, chairman of industrial district No. 17 of the War Industries Board for regional supervision of war work.

B. E. LaFollette, who has had charge of the engineering, sales and advertising departments of the Clarage Fan Co., Kalamazoo, Mich., has resigned to go into Government service July 1. He will be located either in Philadelphia or Washington as an engineer with the requirements division of the United States Shipping Board.

Charles F. Michael of the Ohio Locomotive Crane Co. is president of a building company which manufacturers in Bucyrus, Ohio, affiliated with the Employers' Association of that city have organized. **F. W. Hudson** of the Ohio Steel Foundry is vice president, and **R. O. Perrott** of the American Clay Machinery Co. is secretary.

John McC. Price has recently accepted a position with the Mechanical Appliance Co. of Milwaukee, Wis. Mr. Price has been the Pittsburgh sales agent for the Mechanical Appliance Co. for a number of years, handling its line in conjunction with that of the Century Electric Co. with which he was associated for more than ten years.

W. Herman Greul, some years identified with the Otis Elevator Co., New York, has been made president of the Standard Plunger Elevator Co., Worcester, Mass. A large item in the production of this company is the Powell accelerating planing machine. Mr. Greul is a member of the American Society of Mechanical Engineers.

Frank O. Hoagland has resigned as works manager of the Pratt & Whitney Co., Hartford, Conn., to accept a position as vice president and works manager of the Bilton Machine Tool Co., Bridgeport, Conn. Mr. Hoagland was works manager of the Union Metallic Cartridge Co., Bridgeport, from 1908 to 1915, when he went with the Pratt & Whitney Co.

W. A. Haines has been appointed district representative at Detroit of the Automobile Equipment Department of the Westinghouse Electric and Manufacturing Co. Among the automobile manufacturers of the Detroit district Mr. Haines is well known through his service for some years as assistant district manager of that department of the Westinghouse company.

Messrs. Hartridge and McKay of the New York office of the Allied Machinery Co. of America have gone to France to confer with **C. E. Carpenter,** president of the Allied Machinery Co. de France, who was recently commissioned a captain in the Quartermaster Department, U. S. A., regarding the procedure to follow during the war's duration. They expect to return in three or four months.

A. B. Cole has been appointed assistant to the manager of the department of publicity of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., to succeed **M. C. Turpin,** who has accepted a position in the Ordnance Department at Washington, D. C. Mr. Cole will have charge of the editorial work, including the preparation of literature and supplying information to the press.

Arthur H. Young, director of the American Museum of Safety, 14 West 24th St., New York, will relinquish his present duties July 1 to organize and become director of a department of industrial relations of the International Harvester Co., Chicago, Ill. Mr. Young's efforts will be directed to overcome the tendency toward diminished personal interest and contact between workmen and the management.

Howard Emery, who was manager of the Detroit plant of the Aluminum Castings Co. some years ago and was later transferred to the managership of the Manitowoc plant, has returned to the Detroit factory to occupy the position of manager. This position was recently vacated by **Charles B. Bohn. Arthur Birge,** previously manager of the Ames Tool and Supply Co., Anderson, Ind., has replaced **R. F. Dyer,** recently resigned, and is now district sales supervisor.

Mathias A. Beck, vice president and chief engineer of the Milwaukee Electric Crane and Manufacturing Co., Milwaukee, was elected president of the Engineers' Society of Milwaukee at the annual meeting and banquet held June 12. Other officers elected are: Vice president, William M. White, manager and chief engineer hydraulic department, Allis-Chalmers Manufacturing Co.; secretary, Fred H. Dorner, Jr.; treasurer, Albert Blatz, Jr.; directors, Louis E. Strothman, F. W. Ells and R. P. Kraft.

Clifford S. Anderson, assistant counsel of the Norton Co., Worcester, Mass., and **Clare A. Best** of the Niagara Plant arrived on the steamship "Guiana" from South America recently, having made a return trip by way of the West Indies and Porto Rico. Mr. Anderson, accompanied by **M. A. Williamson,** of the New York store, who is still in South America, left some time ago to visit the new South American organization known as Surinam Norton Co. at Paramaribo, Dutch Guiana. **Thomas C. Fisher,** who previously had charge of the pyrometric work at the Norton Co., has been made the managing director of this new company and will make his home in Paramaribo.

Business Items

Arthur Knapp Engineering Corporation, 30 Church St., New York, is the new incorporated name announced by Arthur Knapp.

The Walker Vehicle Co. has bought the parts, jigs and tools of the Long Island City plant of the General Vehicle Co., which was recently taken over by the Government for war work.

Walter E. Bush, 109 Highland Ave., Jersey City, N. J., has recently been appointed United States buyer for a large importing corporation in Australia. American manufacturers not represented in Australia may be able to secure representation through Mr. Brush.

The Lakewood Engineering Co., Cleveland, Ohio, held a meeting of its sales force at the main plant in Cleveland recently. Over 100 representatives attended the daily sessions and discussed with the sales, production, purchasing and engineering executives the serving of the construction and industrial fields. The Lakewood products include cars, track, clamshells, mixers, chutes, locomotives, etc., for construction and road work and electric tractors, electric trucks, factory trucks, electric locomotives, track, clamshell buckets for the industrial field, including railroads, steel plants, clay plants, quarries, coal mines, fertilizer plants, etc.

Obituary

Joseph Goodman, president of the Goodman Engine and Machine Co., Pittsburgh, Penn., died at his home in the East End, that city, June 5. Mr. Goodman was considered an authority on glass-making machinery.

Frank E. Brightman, general superintendent of the Brightman Nut and Manufacturing Co., Sandusky, Ohio, died May 30, aged 53 years. He was formerly associated with the forging department of the Westinghouse Machine Co., Pittsburgh, Penn.

Herman H. Klusman, Cincinnati, Ohio, treasurer of the J. R. Wood Supply Co., and prominent in machine-tool circles, died suddenly of apoplexy, June 4, aged 54 years. Until about four years ago Mr. Klusman was vice president of the Greaves-Klusman Machine Tool Co., maker of lathes. In partnership with William A. Greaves, the Greaves-Klusman Machine Co. was formed in 1889 for the manufacture of wood-working machinery Ten years later the concern moved to the Camp Washington district and engaged exclusively in the manufacture of lathes.

Henry Fairbanks, for many years vice president of E. & T. Fairbanks & Co., manufacturers of scales, died at his home in St. Johnsbury, Vt., June 8. After his graduation from Dartmouth College in 1853, and Andover Theological Seminary in 1857, Mr. Fairbanks was ordained a minister of the Congregational Church. He preached for three years, and then went to Dartmouth as professor of natural history and natural philosophy from 1860 to 1868, when he became associated with the company founded by his father, Thaddeus Fairbanks, later serving as director and vice president until his retirement from active business life a few years ago. He was 88 years old.

New Publications

Patenting and Promoting Inventions—By Mois H. Avram. One hundred and sixty-six 5¼ x 8-in. pages. Published by Robert M. McBride & Co., Union Sq., New York. Price, $1.50 net, or $1.60 postpaid.

The advice given the inventor or would-be inventor by the author of this book is good, sound horse sense, and if followed will save a class notorious for poor business ability a great deal of money and worry. The author states that 1000 patents a week are granted by the Patent Office, of which less than 10 per cent. are a commercial success. He then proceeds to tell why this is so. He points out the various pitfalls that beset the inventor; he exposes the methods of fake and dishonest patent lawyers; he shows the proper methods of exploitation to pursue; he tells how to value a patent; analyzes the subject of foreign patents, and in fact covers the subject in such an enlightening way that anyone can grasp the ideas he presents. The various chapters cover the field as follows: I, Why Inventors Fail; II, The Origin and Evolution of and a General Review of the Laws Governing the Granting of Patents; III, Protecting an Invention or Discovery by Patent; IV, Foreign Patents; V, Patent Attorneys; VI, Expert Investigation; VII, Evaluating a Patent; VIII, Promoting an Invention. A fact worth noting is that the book is not written by or for some special patent-soliciting firm, but by a lecturer on industrial engineering in New York University, who is also a practical business man.

Forthcoming Meetings

American Society of Mechanical Engineers. Monthly meeting, second Tuesday. Calvin W. Rice, secretary, 29 West 39th St., New York City.

Boston Branch National Metal Trades' Association. Monthly meeting on first Wednesday of each month. Young's Hotel. Donald H. C. Tullock, Jr., secretary. Room 41, 166 Devonshire St., Boston, Mass.

Engineers' Society of Western Pennsylvania. Monthly meeting, third Tuesday; section meeting, first Tuesday. Elmer K. Hiles, secretary, Oliver Building, Pittsburgh, Penn.

New England Foundrymen's Association. Regular meeting, second Wednesday of each month. Exchange Club, Boston, Mass. Fred F. Stockwell, 205 Broadway, Cambridgeport, Mass.

Philadelphia Foundrymen's Association. Meetings first Wednesday of each month. Manufacturers' Club, Philadelphia, Penn. Howard Evans, secretary, Pier 45, North Philadelphia, Penn.

Providence Engineering Society. Monthly meeting fourth Wednesday of each month. A. E. Thornley, corresponding secretary, P. O. Box 796, Providence, R. I.

Rochester Society of Technical Draftsmen. Monthly meeting, last Thursday. O. L. Angevine, Jr., secretary, 857 Genesee St., Rochester, N. Y.

Superintendents' and Foremen's Club of Cleveland. Monthly meeting, third Saturday. Philip Frankel, secretary, 310 New England Building, Cleveland, Ohio.

Western Society of Engineers, Chicago, Ill. Regular meetings, first, second, third and fourth Mondays of each month, except July and August. Edgar S. Nethercut, secretary, 1735 Monadnock Block, Chicago, Ill.

Technical League of America. Regular meeting, second Friday of each month. Oscar S. Teale, secretary, 35 Broadway, New York City.

WEEKLY PRICE GUIDE OF

IRON AND STEEL

The Government Schedule of steel prices went into effect Sept. 24. Pig iron was set at $33 per ton; pig iron differentials were announced by the American Iron and Steel Institute on Nov. 3. Washington announced sheet and pipe prices on Nov. 5. Warehouse prices have been revised, as shown, by agreement between the War Industries Board and the warehouses; new schedule in effect Nov. 15. Effective Apr. 1, the price of basic iron was fixed at $32, and standard Bessemer at $35.20 at Valley furnace, prices of other irons remaining the same as last quarter.

PIG IRON—Quotations per ton were current as follows at the points and dates indicated:

	Current	One Month Ago	One Year Ago
No. 2 Southern Foundry, Birmingham..	$33.00	$33.00	$47.00
No. 2X, New York	34.40	.....	52.50
No. 2 Northern Foundry, Chicago	33.00	37.00	55.00
*Bessemer, Pittsburgh	36.60	37.25	57.95
*Basic, Pittsburgh	32.00	33.95	52.00
No. 2X, Philadelphia	34.40	33.75	52.00
*No. 2, Valley	33.00	33.95	52.00
No. 2 Southern Cincinnati	36.90	35.90	49.90
Basic, Eastern Pennsylvania	32.90	33.75	50.00

*Delivered Pittsburgh; f.o.b. Valley, 95 cents less.

STEEL SHAPES—The following base prices per 100 lb. are for structural shapes 3 in. by ¼ in. and larger, and plates ¼ in. and heavier, from jobbers' warehouses at the cities named:

	New York			Cleveland		Chicago	
	Current	One Month Ago	One Year Ago	Current	One Year Ago	Current	One Year Ago
Structural shapes	$4.245	$4.195	$5.25	$4.17	$4.50	$4.27	$5.00
Soft steel bars	4.145	4.095	5.00	4.07	5.00	4.17	4.50
Soft steel bar shapes	4.145	4.095	5.00	4.17	4.50	4.17	4.50
Soft steel bands	5.045	.....	.....	.....	.....	.....	.....
Plates, ¼ to 1 in. thick	4.495	4.445	9.00	4.42	8.00	4.52	8.00

BAR IRON—Prices per 100 lb. at the places named are as follows:

	Current	One Year Ago
Pittsburgh, mill	$3.50	$4.75
Warehouse, New York	4.75	4.75
Warehouse, Cleveland	4.10	4.95
Warehouse, Chicago	4.10	4.50

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	Pittsburgh, Mill, in Carloads	New York Current	New York One Month Ago	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
*No. 28 black	5.00	6.495	6.445	10.00	6.42	9.50	6.52	9.50
*No. 26 black	4.90	6.395	6.345	9.90	6.32	9.40	6.42	9.40
*Nos. 22 and 24 black	4.85	6.345	6.295	9.85	6.27	9.35	6.37	9.35
Nos. 18 and 20 black	4.80	6.295	6.245	9.80	6.22	9.30	6.32	9.30
No. 16 blue annealed	4.45	6.695	5.645	9.70	5.62	9.70	5.72	9.70
No. 14 blue annealed	4.35	6.595	5.545	9.60	5.52	9.60	5.62	9.60
No. 10 blue annealed	4.25	6.495	5.445	9.50	5.42	9.50	5.52	9.50
*No. 28 galvanized	6.25	7.745	7.695	13.00	7.67	11.00	7.77	11.00
*No. 26 galvanized	5.95	7.445	7.395	12.70	7.37	10.70	7.32	10.70
No. 24 galvanized	5.80	7.295	7.245	12.55	7.22	10.55	7.47	10.55

*For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gage; for galvanized corrugated sheets add 5c., all gages.

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring at least 1000 lb. of a size (smaller quantities take the standard extras) the following discounts hold:

	Current	One Year Ago
New York	List plus 13%	List plus 25%
Cleveland	List plus 13%	List plus 10%
Chicago	List plus 13%	List plus 10%

DRILL ROD—Discounts from list price are as follows at the places named:

	Extra	Standard
New York	35%	40%
Cleveland	35%	40%
Chicago	35%	40%

SWEDISH (NORWAY) IRON—The average price per 100 lb., in ton lots, is:

	Current	One Year Ago
New York	$15.50–19	$20.00
Cleveland	20.00	12.30
Chicago	19.00	12.00

In coils an advance of 50c. usually is charged.

Note—Stock very scarce generally.

WELDING MATERIAL (SWEDISH)—Prices are as follows in cents per pound f.o.b. New York, in 100-lb. lots and over:

Welding Wire*

⅜, 11, ¼, 9/32, 7/32, 5/32, No. 8, 5/16 and 2.5 mm., 10, 3/16, No. 12, No. 14 and 1/8 in., No. 18, No. 20	22.10 to 33.00

Very scarce.

Cast-Iron Welding Rods

¼ by 12 in. long	16.00
¼ by 19 in. long	14.00
⅜ by 19 in. long	12.00
½ by 21 in. long	12.00

***Special Welding Wire**

¼	33.00
5/16	30.00
⅜	38.00

MISCELLANEOUS STEEL—The following quotations in cents per pound are from warehouse at the places named:

	New York Current	Cleveland Current	Chicago Current
Tire	4.10	4.07	4.17
Toe calk	5.70	4.57	4.32
Openhearth spring steel (heavy)	7.50	8.00	7.60
Spring steel (light)	11.00	11.25	11.25
Coppered bessemer rods	9.00	8.00	7.07
Hoop steel	4.99½	4.75	5.02
Cold-rolled strip steel	8.50	8.25	8.57
Floor plates	6.24½	6.00	7.07

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

BUTT WELD

Steel Inches	Steel Black	Steel Galvanized	Iron Inches	Iron Black	Iron Galvanized
⅛, ¼ and ⅜	44%	17%	¾ to 1½	33%	17%
½	48%	33½%			
¾ to 3	51%	37½%			

LAP WELD

2	44%	31½%	2	26%	12%
2½ to 6	47%	34½%	2½ to 4	28%	15%
			4½ to 6	28%	15%

BUTT WELD, EXTRA STRONG PLAIN ENDS

⅛, ¼ and ⅜	40%	22½%	¾ to 1½	33%	18%
½	45%	32½%			
¾ to 1½	49%	36½%			

LAP WELD, EXTRA STRONG PLAIN ENDS

2	42%	30½%	2	27%	14%
2½ to 4	45%	33½%	2½ to 4	29%	17%
4½ to 6	44%	32½%	4½ to 6	28%	16%

Stock discounts in cities named are as follows:

	New York Black	New York Galvanized	Cleveland Black	Cleveland Galvanized	Chicago Black	Chicago Galvanized
¾ to 3 in. steel butt welded	33%	16%	43%	28%	41.9%	26.9%
3½ to 3 in. steel lap welded	15%	3%	39%	25%	37.9%	23.9%

Malleable fittings, Class B and C, from New York stock sell at list price. Cast iron, standard sizes, 10 and 5%.

METALS

MISCELLANEOUS METALS—Present and past New York quotations in cents per pound, in carload lots:

	Current	One Month Ago	One Year Ago
Copper, electrolytic	23.50*	23.50	30.00
Tin, in 5-ton lots	95.00	85.00	62.00
Lead	7.90	7.25	11.50
Spelter	8.50	7.50	9.25

*Government price.

ST. LOUIS

Lead	7.72½	7.25	9.25
Spelter	8.22½	7.10	12.00

At the places named, the following prices in cents per pound prevail, for 1 ton or more:

	New York Current	New York One Month Ago	New York One Year Ago	Cleveland Current	Cleveland One Year Ago	Chicago Current	Chicago One Year Ago
Copper sheets, base	32.50-33.00	32.50	42.00	34.00	42.00	33.50	42.00
Copper wire (carload lots)	31.00	31.00	47.50	30.00	46.00	33.00	47.00
Brass sheets	31.75	31.75	39.13	30.00	39.50	31.50	39.37
Brass pipe base	36.50	36.50	45.00	41.00	38.00	41.50	43.00
Solder ½ and ½ (case lots)	70.00	70.00	39.50	62.00	39.00	70.00	39.00

Note:—Solder very scarce.

Copper sheets quoted above hot rolled 16 oz., cold rolled 14 oz. and heavier, add 1c.; polished takes 1c. per sq.ft. extra for 20-in. widths and under; over 20 in., 2c.

BRASS RODS—The following quotations are for large lots, mill, 100 lb. and over, warehouse; 25% to be added to mill prices for extras; 50% to be added to warehouse price for extras:

	Current	One Year Ago
Mill	$25.25	$42.00
New York	26.25	45.50
Cleveland	30.00	38.00
Chicago	29.50	42.50

ZINC SHEETS—The following prices in cents per pound prevail:

Carload lots f.o.b. mill 15.00

	In Casks Current	In Casks One Year Ago	Broken Lots Current	Broken Lots One Year Ago
Cleveland	18.75	21.00	18.40	21.50
New York	16.50	23.00	17.00	23.25
Chicago	22.00	22.50	21.50	23.50

ANTIMONY—Chinese and Japanese brands in cents per pound, in ton lots, for spot delivery, duty paid:

	Current	One Year Ago
New York	13.12½	19.00
Chicago	13.50	21.00
Cleveland	16.00	19.50

There is an apparent discrepancy at this point.

The pages are either missing or the pagination is incorrect.

The filming is recorded as the book is found in the collections.

SHOP MATERIALS AND SUPPLIES

OLD METALS—The following are the dealers' purchasing prices in cents per pound:

	New York		Cleveland		
	Current 1918	One Yr. Ago	Current 1918	One Yr. Ago	Chicago
Copper, heavy and crucible	22.00	28.50	29.00	27.00	22.75
Copper, heavy and wire	21.00	27.50	28.00	29.00	22.00
Copper, light and bottoms	19.00	25.50	24.00	25.00	20.75
Lead, heavy	6.25	10.00	6.50	10.25	7.50
Lead, tea	5.00	8.75	5.50	8.25	6.50
Brass, heavy	14.00	18.00	18.00	18.50	23.00
Brass, light	10.50	14.00	14.00	14.75	12.00
No. 1 yellow brass turnings	12.50	18.00	19.00	17.75	13.00
Zinc	5.25	7.25	5.50	6.75	6.25

ALUMINUM—The following prices are from warehouse at places named:

	New York	Cleveland	Chicago
No. 1 aluminum, guaranteed over 99% pure, in ingots for remelting (ton lots) per lb.	32.20c.	32.20c.	33½c.

This is the Government price for lots of from 1 to 14 tons.

COPPER BARS from warehouse sell as follows in cents per pound, for ton lots and over:

	Current	One Year Ago
New York	38.00	41.00
Chicago	38.00	41.00
Cleveland	35.00	41.00

BABBIT METAL—Warehouse price per pound:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Best grade	125.00	70.00	113.00	70.00	100.00	70.00
Commercial	70.00	40.00	23.00	24.50	24.00	30.00

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair-sized orders, the following amount is deducted from list:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Year Ago
Hot pressed square	$2.50*	List	$1.40	$1.65	$1.05	$3.00
Hot pressed hexagon	2.50*	List	1.20	1.50	.85	3.00
Cold punched square	2.50*	List	.75	1.40	1.00	1.75
Cold punched hexagon	2.50*	List	.75	1.40	1.00	2.25

* List plus.

Semifinished nuts sell at the following discounts from list price:

	Current	One Year Ago
New York	40%	50%
Chicago	50%	50%
Cleveland	60%	50%

CARRIAGE BOLTS—From warehouses at the places named the following discounts from list are in effect:

	New York	Cleveland	Chicago
⅝ by 6 in.	30%	45%	30—2½%
Larger and longer	10%	33⅓%	20—5%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
⅝ by 4 in. and smaller	30—5%	46%	37%
Larger and longer up to 1 in. by 30 in.	30%	40%	25—5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

For wrought-iron washers:
New York ..... $2.50 Cleveland ..... $3.00 Chicago $2.50

For cast-iron washers the base price per 100 lb. is as follows:
New York ..... $3.50 Cleveland ..... $4.00 Chicago $3.50

COPPER RIVETS AND BURS sell at the following rate from warehouse:

	Rivets		Burs	
	Current	One Year Ago	Current	One Year Ago
Cleveland	List plus 10%	List plus 10%	List plus 10%	List plus 10%
Chicago	List price	List price	List plus 20%	List price
New York	20% from list	10-2½% from list	List plus 20%	10-2½% from list

RIVETS—The following quotations are allowed for fair-sized orders from warehouse:

	New York	Cleveland	Chicago
Steel ⅛ and smaller	30%	45—5%	45%*
Tinned	30%	45—5%	45%*

Button heads, ¾, ⅞, 1 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.:
New York..$6.09½ Cleveland..$5.15 Chicago..$5.50 Pittsburgh..$4.65

Coneheads, same sizes:
New York..$6.19½ Cleveland..$5.25 Chicago..$5.60 Pittsburgh..$4.75

MISCELLANEOUS

SEAMLESS DRAWN TUBING—The base price in cents per pound from warehouse in 100-lb. lots is as follows:

	New York	Cleveland	Chicago
Copper	35.50	40.00	39.50
Brass	39.00	41.00	44.00

For immediate stock shipment 3c. is usually added. The prices of course vary with the quantity purchased. For lots of less than 100 lb. but not less than 75 lb., the advance is 1c.; for lots of less than 75 lb. but not less than 50 lb., the advance is 2½c. over base (100-lb. lots); for less than 50 lb. but not less than 25 lb., 5c. should be added to the base price; and for quantities under 25 lb. the increase above base is 10c.

TIN PLATES—Warehouse prices per box:

Coke tin plate, 14 x 20:

	Cleveland		Chicago	
	Current	One Yr. Ago	Current	One Yr. Ago
100 lb.	$10.00	$12.00	$10.57	$11.60
I. C. 107 lb.	10.15	12.17	10.65	11.75

Terne plate, 20 x 28:

Base Weight	Net Weight	Coating				
100 lb.	200	3	18.95	18.70	19.07	16.50
I. C.	214	8	19.25	19.00	19.37	16.85
I. C.	270	8	21.75	21.50	21.37	18.95
I. C.	218	12	21.75	19.85	12.57	17.85
I. C.	221	15	22.50	20.35	22.07	18.10
I. C.	226	30	23.25	21.75	22.57	19.15
I. C.	231	25	24.50	22.00	23.07	19.90
I. C.	236	30	25.75	23.00	23.57	20.85
I. C.	241	35	26.75	24.00	25.07	21.80
I. C.	246	40	28.00	25.75	25.57	23.15

NOTE—New York prices furnished on application to dealers. Price varies according to whether the plates are wanted for work essential to the war or for nonessential work.

COTTON WASTE—The following prices are in cents per pound:

	New York		Cleveland	Chicago
	Current	One Year Ago		
White	11.00 to 13.00	13.00	16.50	12.00 to 16.50
Colored mixed	8.50 to 12.00	10.00	13.00	11.50 to 14.00

WIPING CLOTHS—Jobbers' price per 1000 is as follows:

	13¼ x 13¼	13¼ x 20½
Cleveland	52.00	58.00
Chicago	48.00	50.00

SAL SODA sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$1.75	$1.75	$1.75
Philadelphia	1.75	1.75	1.75
Cleveland	2.40	2.35	2.10
Chicago	2.00	2.00	2.00

ROLL SULPHUR in 360-lb. bbl sells as follows per 100 lb.:

	Current	One Month Ago	One Year Ago
New York	$4.30	$4.30	$2.85
Cleveland	4.50	4.50	3.50
Chicago	4.65	4.65	3.00

COKE—The following are prices per net ton at ovens, Connellsville, and cover the past four weeks:

	June 20	June 13	June 6	May 30
Prompt furnace	$6.00	$6.00	$6.00	$6.00
Prompt foundry	7.00	7.00	7.00	7.00

FIRE CLAY—The following prices prevail:

		Current
Chicago	450-lb. bbl.	$2.50
Cleveland	375-lb. bag	2.50

LINSEED OIL—These prices are per gallon:

	New York		Cleveland		Chicago	
	Current	One Year Ago	Current	One Year Ago	Current	One Yr. Ago
Raw in barrels	$1.65	$1.31	$1.75	$1.32	$1.70	$1.32
5-gal. cans	1.75	1.41	1.90	1.42	1.80	1.37

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red				White	
	Current		1 Year Ago		Current	1 Year Ago
	Dry	In Oil	Dry	In Oil	Dry and In Oil	Dry and In Oil
25 and 50-lb. kegs	12.38	12.83	13.25	13.50	12.38	13.00
12½-lb. keg	12.60	13.05	13.50	13.50	12.60	13.25
100-lb. keg	12.15	12.29	13.75	14.00	12.15	13.00
5-lb. cans	13.95	.....	15.25	15.50	13.95	15.00
1-lb. cans	14.85	.....	.....	.....	14.85	.....

NEW *and* ENLARGED SHOPS

Consult the Buying Section when in need of machinery or supplies

WASHINGTON, D. C.

The Navy aims to give information regarding its purchases to all manufacturers known to be in a position to supply its demand. Owing to the need of prompt action in the cases of all machine tools hereinafter listed, the Navy cannot arrange to permit a postponement of the opening of bids if the manufacturers are able to secure bidding forms and submit their bids prior to date fixed for opening.

In case time does not permit this, it will be appreciated if any manufacturer not receiving information directly regarding these purchases will notify the Purchasing Division, Bureau of Supplies & Accounts, Navy Department, Wash., D. C., in order that the firm's name may be properly listed for all future purchases.

Bureau of Supplies and Accounts, Navy Department, is in the market for machines and machine tools as follows:

Shaper machine; Schedule No. 4846½, delivery Navy Yard, Philadelphia, Penn.

Lathes; Schedule No. 4849½, delivery Annapolis, Md.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, for furnishing machines and machine tools as follows.

July 8, 1 hobbing machine, Schedule 4784½ and screw machines, Schedule 4777½; delivery Navy Yard, Wash., D. C.

July 12, 1 braiding machine, Schedule 4843½, delivery Navy Yard, Boston, Mass.

July 12, lathes, Schedule 4854½, delivery Navy Yard, Philadelphia, Pa.

July 12, 1 knife grinding machine, Schedule 4855½, delivery Navy Yard, Wash., D. C.

July 12, saw filing and setting machines, Schedule 4857½, delivery Navy Yard, Wash., D. C.

July 15, machinists vises, Schedule 4880½, delivery Navy Yard, Philadelphia, Pa.

July 15, bolt heading machine, Schedule 4839½, delivery Iona Island, N. Y.

July 9, (Item 1) 1 horizontal, boring, drilling and milling machine; Class 8, Schedule No. 1843, delivery Navy Yard, Wash., D. C.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, for furnishing machines and machine tools as follows:

(Item 1—5 water tool grinders. Class 380, Schedule No. 4688½, from Young, Corley & Dolan, Inc., 115 Bway, New York City, $134, f.o.b.; Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $218, alternate, $230; Monarch Machine Co., 300 North 3d St., Philadelphia, Penn., $222, alternate, $204; J. Clark, Jr., Electric Co., 520 West Main St., Louisville, Ky., $225; Manning, Maxwell & Moore, 119 West 40th St., New York City, $319; Swind Machine Co., Widener Bldg., Philadelphia, Penn., $779.

(Item 1)—3 motor-head, speed lathes. Class 386, Schedule No. 4693, from Greenfield Tap and Die Corporation, Deerfield, Mass., $175; Oliver Machine Co., 50 Church St., New York City, $220; Manning, Maxwell & Moore, 119 West 40th St., New York City, $280.

(Item 1)—1 plate planer. Class 388, Schedule No. 4695, from Niles, Bement & Pond, 111 Bway, New York City, $63,900.

(Item 1)—1 universal, boring, drilling and milling machine, Schedule No. 4685, from Dale Brewster Machine Co., Inc., 34 Lafayette St., New York City, $12,325.

(Item 1)—1 motor-driven, breaching machine, Class 394, Schedule No. 4701½, delivery Navy Yard, Charleston, S. C., from Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $2,475; La Pointe Machine Tool Co., Tower St., Hudson, Mass., $2,260; Manning, Maxwell & Moore, 119 West 40th St., New York City, $2,475; D. Nast Machine Co., Bourse St., Philadelphia, Penn., $2,060, alternate, $2,214 and $2,120; J. N. La Pointe Co., 35 Pequot Ave., New London, Conn., $2,475; Young, Corley & Dolan Co., Inc., 115 Bway, New York City, $2,075, alternate, $1,750.

(Item 4)—25 small bench trimmers, Class 419, Schedule No. 4729½, delivery, Navy Yard, Wash., D. C., from Aumen Machine Co., 107 East Lombard St., Baltimore, Md., 046; Fox Machine Co., 1304 West Ganson St., Jackson, Mich., $50; Manning, Maxwell & Moore, 119 West 40th St., New York City, $51; D. Nast Machine Co., Bourse, Philadelphia, Penn., $52; Sherritt Stoer Co., Finance Bldg., Philadelphia, Penn., $50; Oliver Machine Co., 50 Church St., New York City, $43, alternate, $55 and $70; Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $51.

(Item 1)—2 machines for drying cotton, Class 421, Schedule No. 4731½, delivery, Navy Yard, Wash., D. C., for Indian Head, Md., from Philadelphia Textile Machine Co., 6th and Tabor Rd., Philadelphia, Penn., $3,395; Philadelphia Drying Machine Co., Germantown, Philadelphia, Penn., $3,010.

(Item 1)—2 motor-driven, complete double spindle, bolt threading machines, Class 423, Schedule No. 4733½, delivery, Navy Yard, Norfolk, Va., from Acme Machine Co., 4533 St. Clair Ave., Cleveland, Ohio, $1,704; Landis Machine Co., Waynesboro, Penn., $1,844; Manning, Maxwell & Moore, 119 West 40th St., New York City, $1,804.

(Item 1)—1 motor and drum type controller and pulley, Class 427, Schedule No. 4735½, delivery, Navy Yard, Brooklyn, N. Y., from Diehl Manufacturing Co., Trumbull St., Elizabeth, N. J., $252; Eck Dynamo & Motor Co., Main St., Belleville, N. J., $271; Fidelity Electric Co., 331 North Arch St., Lancaster, Penn., $215; The Ideal Electric and Manufacturing Co., 153 East 5th St., Mansfield, Ohio, $405; General Electric Co., River Rd., Schenectady, N. Y., $353; Mechanical Appliance Co., 133 Stewart St., Milwaukee, Wis., $241; Reliance Electric and Engineering Co., 90 West St., New York City, $259; Robbin & Meyers Co., Lagonda Ave. and Farlow St., Springfield, Ohio, $254; Roth Bros., 1400 West Adams St., Chicago, Ill., $413.

(Item 1)—1 motor driven, milling, boring, drilling, horizontal machine, Class 393, delivery, Navy Yard, Charleston, S. C., from Bethlehem Steel Co., Continental Bldg., Baltimore, Md., $13,477; Landis Tool Co., Philadelphia, Penn., $11,950; Niles Bement Pond Co., 111 Bway, New York City, $14,450.

(Item 2)—Class 394, Schedule No. 4700½, from Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $2,475; La Pointe Machine Tool Co., Tower St., Hudson, Mass., $2,260; alternate, Manning, Maxwell & Moore, 119 West 40th St., New York City, $2,475; D. Nast Machine Co., Bourse St., Philadelphia, Penn., $2,060, alternate, $2,214 and $2,120; J. N. La Pointe Co., 35 Pequot Ave., New London, Conn., $2,475; Young, Corley & Dolan, Inc., 115 Bway, New York City, $2,075, alternate, $1,750.

(Item 2)—One 30-in. radial drill. Class 401, Schedule No. 4707½, from H. A. Wright Manufacturing Co., Hartford, Conn., $1,000; Swind Machine Co., Widener Bldg., Philadelphia, Penn., $560.

(Item 1)—Two 2-in. capacity internal grinders, Class 418, Schedule No. 4728½, from Bryant Chucking Grinder Co., Springfield, Vt., $3,705; Heald Machine Co., Barber's Crossing, Worcester, Mass., $3,140, alternate, $2,740; Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $2,132; Manning, Maxwell & Moore, 119 West 40th St., New York City, $1,750; D. Nast Machine Co., Bourse St., Philadelphia, Penn., $1,726; Perkins Grinder Co., Grand Rapids, Mich., $2,400.

(Item 1)—1 motor driven, profile grinder. Class 415, Schedule No. 4723½, from D. Nast Machine Co., Bourse St., Philadelphia, Penn., $300.

(Item 1)—10 tool combination floor and bench type grinders, Class 416, Schedule 4724½, from Cincinnati Electric Tool Co., Freeman and Flint St., Cincinnati, Ohio, $128; Kimbie Electric Co., 634 North Western Ave., Chicago, $172; Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $130; Manning, Maxwell & Moore, 119 West 40th St., New York City, $130; D. Nast Machine Co., Bourse St., Philadelphia, Penn., $100, alternate, $107; Roth bros. & Co., 1400 West Adams St., Chicago, $117.

(Item 1)—2 motor driven milling machines, Class 409, Schedule No. 4715, from Kemp Machine Co., 223 North Calvert St., Baltimore, Md., $482; Manning, Maxwell & Moore, 119 West 40th St., New York City, $268; Niles Bement & Pond, 111 Bway, New York City, $500; D. Nast Machine Co., Bourse St., Philadelphia, Penn., $485, alternate, $445 and $610; Swind Machine Co., Widener Bldg., Philadelphia, Penn., $1,375; Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Penn., $630; Young, Corley & Dolan, Inc., 115 Bway, New York City, $670, f o.b.

(Item 1)—1 motor driven, profile grinder, Class 415, Schedule No. 4723½, from D. Nast Machine Co., Bourse St., Philadelphia, Penn., $300.

Wash., D. C.—Bureau of Supplies and Accounts, Navy Department, has awarded the contract for furnishing machines and machine tools as follows:

6 milling machines; Class 552, Schedule No. 4468½, to Van Norman Machine Tool Co., 169 Wilbraham Ave., Springfield, Mass., $7736.

8 tool maker's engine lathes; Class 593, Schedule No. 4508½, to Pratt & Whitney Co., 436 Capital Ave., Hartford, Conn., $14,272.

1 plate planing machine; Class 598, Schedule No. 4517½, to W. Sellers & Co., Inc., 16th and Hamilton St., Philadelphia, Penn., $11,200.

METAL WORKING

NEW ENGLAND STATES

Conn., New Haven—The Holmes Special Tool Co. is building a 2 story, 32 x 64 ft. factory on Canal St. Estimated cost, $10,000.

Conn., Waterbury—The H. W. Connor Co., 452 Meadow St., plans to build a 1-story, 56 x 97 ft. garage. Estimated cost, $25,000. L. A. Walsh, 51 Leavenworth St., Arch.

Mass., Boston (South Boston)—The Gillette Safety Razor Co., 41 West 1st St., has awarded the contract for the construction of a 7-story, 300 x 375 ft. addition to its factory. Estimated cost, $500,000. Noted June 20.

Mass., Boston—M. Rudnick, 40 Court St., will build a 1-story, 50 x 200 ft. garage. Estimated cost, $60,000. F. A. Norcross, 46 Cornhill St., Arch.

Mass., Everett—C. E. Hobbs, 12 Pearl St., Boston, manufacturer of hardware, will build a 1-story, 32 x 60 ft. addition to his factory here. Estimated cost, $6,000.

Mass., Gloucester—The Cape Ann Anchor and Forge Co., Whittemore St., is in the market for a 15-ton crane of 56 ft. span with a 3- or 5-ton auxiliary.

Mass., Holyoke—The Walsh's Holyoke Steam Boiler Works has awarded the contract for the construction of a 3-story, 30 x 70 ft. office building and garage. Estimated cost, $30,000.

Mass., Holyoke—The Dean Works of the Worthington Pump Machinery Co., Appleton St., has awarded the contract for the construction of a 1-story 90 x 200 ft. addition to its machine shop and a 1-story 80 x 180 ft. addition to its foundry. Noted May 23.

Mass., Lynn—The General Electric Co., 42 Center St., is in the market for a 30-ton, four motor crane, with 5-ton auxiliary.

Mass., Winchester—The Whitney Machine Co., 667 Main St., is building a 3-story, 54 x 70 ft. factory and is in the market for lathes and drills. Estimated cost, between $45,000 and $50,000.

Mass., Worcester—The W. H. Sawyer Lumber Co., 66 Lincoln St., has awarded the contract for the construction of a garage. W. H. Sawyer, Pres.

Mass., Worcester—The Worcester Stamped Metal Co., 9 Hunt St., is building an addition to its plant. Estimated cost, $10,000.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Bartlett Hayward Co., Scott and McHenry St., is in the market for two 10-ton cranes of 36-ft. span, one 15-ton of 35-ft. span and one 115-ton of 119-ft. span.

Md., Baltimore—The Elliott Machine Corporation, Bush and Severn St., will build a 1-story, 50 x 125 ft. erecting and machine tool shop on Bayard and Wicomico St. Estimated cost $75,000.

N. J., Camden—Warren & Webster, Point and Pearl St., manufacturer of ventilating specialties and heating systems, will soon award the contract for a 2-story, 43 x 71 ft. factory to be erected on Pearl St. between Delaware Ave. and Point St. Ballinger & Perrot, 17th and Arch St., Philadelphia. Penn., Arch.

N. J., Dunellen—The G. C. Moon Co., Garwood, manufacturer of wire rope, has awarded the contract for a 1-story, 80 x 200 ft. plant to be erected here.

N. J., Garwood—Fire recently destroyed portion of the plant of the Armor Bronze Co. Loss, $20,000.

N. J., Harrison—Fire recently destroyed one of the buildings of the Otis Elevator Co., 1st St. Loss, $25,000.

N. J., Jersey City—H. McIntyre, 335 Union St., will soon start construction work on his 1 story, 24 x 66 ft. brass foundry. Estimated cost, $3000.

N. J., Paterson—The American Shell Co., 250 21st Ave., has purchased a site on 36th and 37th St. and plans to build several additions to its plant.

N. Y., Albany—The Ferguson Steel and Iron Co., 1499 Bailey Ave., has had plans prepared for the construction of a mould shop and shed. Estimated cost, $7,000.

N. Y., Buffalo—The Automatic Transportation Co., 2933 Main St., manufacturer of automatic transportation equipment, has awarded the contract for the construction of a 3-story, 60 x 70 ft. storage building. Estimated cost, $70,000. Noted June 27.

N. Y., Buffalo—The Donner Steel Co., 475 Abbott Rd., plans to build a 180 oven coke plant. Estimated cost, $3,000,000. H. Koppers Co., Pittsburg, Penn., Engr.

N. Y., Buffalo—The Strong Steel Co., 33 Norris St., is receiving bids for the construction of a 1-story, 80 x 300 ft. foundry and machine shop. Estimated cost, $75,000.

N. Y., New York—(Borough of Bronx)—The Newet Realty Co., 200 Bway, New York City, will build a 1-story, 100 x 100 ft. garage on River St. north of 149th St. Estimated cost, $20,000. P. Wattenberg, 960 Prospect Ave., broker.

N. Y., New York (Borough of Brooklyn)—J. Acomadelo, 215 Montague St., will build a 2-story, 25 x 100 ft. garage on Lexington Ave. West of Patchen Ave. Estimated cost, $25,000. Cohn Bros., 361 Stone Ave., Arch.

N. Y., New York—(Borough of Brooklyn)—J. Butler, Inc., 393 Washington St., New York City, has awarded the contract for the construction of a 2-story, 50 x 100 ft. addition to its garage. Estimated cost, $45,000.

N. Y., New York (Borough of Brooklyn)—N. V. Caifa, 368 St. Marks Ave., plans to build a 1-story, 50 x 114 ft. garage on Bergen St., west of Grand Ave. Bly & Hamann, 833 St. John's Place, Arch.

N. Y., New York—(Borough of Brooklyn)—R. H. Comey, 73 19th St., is building a 1-story, 100 x 100 ft. garage on 18th St. west of 3d Ave. Estimated cost, $13,500.

N. Y., New York (Borough of Brooklyn)—M. Ginsberg and S. Moss, 122 Livingston St., will soon receive bids for a 1 story, 71 x 130 ft. garage to be erected on De Kalb Ave. west of Bushwick Ave. Estimated cost, $35,000.

N. Y., New York—(Borough of Brooklyn)—P. Hamill, c/o B. W. Dorfman, Arch., 26 Court St., will build a 1-story, 44 x 70 ft. garage. Estimated cost, $10,000.

N. Y., New York—(Borough of Brooklyn)—C. Martino, 2911 West 30th St., has awarded the contract for a 1-story, 107 x 127 ft. garage to be erected on 17th St. and Neptune Ave. Estimated cost, $15,000. Noted June 27.

N. Y., New York (Borough of Brooklyn)—The N. R. Realty Co., 4408 15th Ave., will build a 1-story, 10 x 18 ft. garage. Estimated cost, $10,000. S. Willman Sons, 26 Court St., Arch.

N. Y., New York—(Borough of Brooklyn)—Rogers & Hagardy, 3rd Ave. and 125th St., New York City, plans to build a 2-story, 100 x 170 ft. garage here on Grand Ave. north of Myrtle Ave. Estimated cost, $50,000. Carlson & Wiseman, 226 Henry St., Arch.

N. Y., New York (Borough of Brooklyn)—E. Schoen, Arch., 112 East 19th St., New York City, will soon award the contract for a 1-story, 50 x 122 ft. garage to be erected on St. Johns Pl. east of Classon Ave. for M. Fuch, 855 Park Place. Estimated cost, $14,000.

N. Y., New York—(Borough of Manhattan)—The Delancey Realty Co., 51 Chamber St., plans to build a 4-story, 34 x 92 ft. garage at 325-27 East 9th St. Estimated cost, about $30,000. C. B. Meyers, 1 Union Sq., Arch.

N. Y., New York (Borough of Manhattan)—The Interstate Garages, Inc., 47 West 34th St., plans to build a 5-story, 200 x 350 ft. garage and service station on Second Ave. between 47th and 48th St. Estimated cost, about $1,000,000. J. Pettit, 103 Park Ave., Arch.

N. Y., New York—(Borough of Manhattan)—B. McQuillan, 437 East 65th St., has awarded the contract for the construction of a garage. Estimated cost, $12,000. Noted Apr. 18.

N. Y., New York (Borough of Manhattan)—C. B. Meyers, Arch., 1 Union Sq., will receive bids about July 20 for a 1-story, 50 x 100 ft. garage to be erected at 73-75 East 130th St. for the Benson Realty Co., 31 Nassau St. Estimated cost, $15,000.

N. Y., New York—(Borough of Manhattan)—Moore Estate, c/o Arch., has had plans prepared by P. C. Hunter, Arch., 191 9th Ave., for the construction of a 2-story, 50 x 98 ft. garage to be leased to the Auto Car Sales Co., 553 West 23rd St.

N. Y., New York (Borough of Manhattan)—F. X. O'Connor, 255 West 47th St., has awarded the contract for a 4-story, 50 x 100 ft. garage to be erected at 257-59 West 47th St. Estimated cost, $20,000. Noted Mar. 28.

N. Y., New York—(Borough of Manhattan)—The Remacle-Hummel Gear and Machine Works, 21 Rose St., recently incorporated, plans to build an addition to its plant. L. L. Remacle, Pres.

N. Y., New York (Borough of Manhattan)—The 352 West Forty-First St. Co., Inc., 55 Liberty St., has awarded the contract for a 2-story, 80 x 197 ft. garage to be erected at 351-57 West 40th St. Estimated cost, $45,000.

N. Y., New York—(Borough of Queens)—The Long Island R. R. plans to build a 1-story, 40 x 100 ft. addition to its engine repair plant in the Newtown Creek section of Long Island City. Estimated cost, $15,000. L. V. Morris, Jamaica, Ch. Engr.

N. Y., New York—(Borough of Queens)—R. Rehm & Co., 11 South Chase Ave., Hammels, L. I., has awarded the contract for twenty-six 1-story, 50 x 134 ft. garages to be erected on North Division St. Estimated cost, $7,000 each.

N. Y., New York—(Borough of Queens)—The Triangle Holding Co., 44 Court St., Brooklyn, is having plans prepared by H. J. Nurick, Arch., 957 Bway., Brooklyn, for a 2-story, 95 x 105 ft. garage to be erected in Long Island City. Estimated cost, $75,000.

N. Y., Niagara Falls—Mills, Rhines, Belman & Nordoff, Arch., Ohio Bldg., Toledo, Ohio, is receiving bids for a 1-story, 150 x 300 ft. factory to be erected on Highland Ave. for the United States Light and Heat Co., manufacturer of heating specialties. Estimated cost, $75,000.

N. Y., Oneida—The Westcott Chuck Co., 54 East Walnut St., manufacturer of machine chucks, has increased its capital from $150,000 to $200,000 and plans to build additions to its plant.

N. Y., Owego—The Owego Bridge Co. is building a 28 x 130 ft. addition to its plant and plans to install necessary machinery and cranes in same. The company also plans to build a 60 x 110 ft. addition.

N. Y., Poughkeepsie—The United States Ammunition Co. has acquired the former factory of the Fiat Automobile Co. and plans to equip same for the manufacture of 6 in. and 9.2 in. shells.

N. Y., Warwick—The Board of Inebriety, 300 Mulberry St., New York City, has had plans prepared by C. B. Meyers, Arch., Union Sq., New York City, for the construction of a group of institutional buildings here, which will include a garage. Estimated cost, $200,000. S. Levy, Pres.

Penn., Avonmore—The National Roll and Foundry Co. is building an 80 ft. addition to its foundry and installing its third air furnace.

Penn., Berwick—Fire recently damaged the plant of the American Car and Foundry Co.

Penn., Bethlehem—The Bethlehem Steel Co. is receiving bids for the construction of a blower house. Estimated cost, $6,000.

Penn., Chester—The American Steel Foundry Co. has awarded the contract for the construction of a 1-story machine shop.

Penn., Connellsville—The McCairns Foundry Co., 6th St., West Side, manufacturer of rough castings, has awarded the contract for the construction of a 60 x 65 ft. addition with a 20 ft. eave.

Penn., Copley—The Atlas Portland Cement Co. is in the market for new machinery with which to equip its plant.

Penn., Ellwood City—The American Steel Co. manufacturers of wire, is building a 75 x 280 ft. addition to its plant and plans to install machinery in same.

Penn., Midland—The Crucible Steel Co., Oliver Bldg., Pittsburg, plans to build additions to its plant here to include a new furnace. The company will install additional equipment. Estimated cost, $1,000,000.

Penn., Millvale—The E. T. Lippert Saw Co., 608 Lincoln Ave., manufacturer of saws, plans to build a 3-story, 35 x 145 ft. machine shop addition to its plant. Estimated cost, $40,000.

Penn., Monongahela—The LeMoyne Steel Co. plans to build a new plant for the manufacture of high speed steel.

Penn., New Brighton—The Pittsburgh Tool Steel Wire Works has awarded the contract for the construction of an addition to its plant. Estimated cost, $11,000.

Penn., Nicetown (Philadelphia, P. O.)—The Midvale Steel and Ordance Co., Widener Bldg., Philadelphia, is in the market for 120 large machine tools and 27 electric cranes with which to equip its gun plant here.

Penn., Philadelphia—The American Galvanizing Co., 3300 Grays Ferry Rd., is having plans prepared for an addition to its plant to be erected on 25th and Morris St.

Pa., Philadelphia—The Atlantic Refining Co., 3144 Passyunk St., is in the market for a 5-ton crane, 20 ft. span.

Penn., Philadelphia—B. T. Conn., 3016-18 Frankford Ave., has awarded the contract for the construction of a 2-story addition to his garage. Estimated cost, $12,000.

Penn., Philadelphia—The G. & H. Barnett Co., 1078 Frankford Ave., manufacturer of files, rasps, etc., has awarded the contract for a 1-story, 15 x 200 ft. factory to be erected on Richmond St., west of Frankford Ave. Estimated cost, $15,000. Noted June 27.

Penn., Philadelphia—Gosa Brockman Co., 12 North 5th St., has awarded the contract for a 1-story, 60 x 62 ft. machine shop with a 12 x 20 ft. wing to be erected on 11th and Schiller St. Estimated cost, $13,000.

Penn., Philadelphia—The Haas Automobile & Supply Co., 4303 North 15th St., manufacturer of automobile specialties, plans to build a 3-story, 20 x 100 ft. factory and office building at 3043 Broad St.

Penn., Philadelphia—The Hero Manufacturing Co., Gaul and Adam St., manufacturer of oilers, metal specialties, etc., has awarded the contract for a 1-story, 40 x 200 ft. machine shop to be erected on turer of oilers, metal specialties, etc., has Stokely St., near Westmoreland Ave. Estimated cost, $25,000.

Penn., Philadelphia—The Niles-Bement-Pond Co., 21st and Callowhill St., has awarded the contract for a 1-story, 65 x 115 ft. addition to its foundry at Ruffner and Donath St.

Penn., Philadelphia—The Pennsylvania R. R. Co., Broad St. Station, will soon award the contract for furnishing eight 87½ ft., 100 ton cranes, equipped with two 15 ton auxiliary hoists. A. C. Shand, Ch. Engr.

Penn., Pittsburgh—The Fort Pitt Bedding Co., Plymouth St., is in the market for a multiple punch for ⅞-in. plate stock.

Penn., Pittsburgh—M. Glukoff, 707 Liberty Ave., has awarded the contract for the construction of an addition to his garage. Estimated cost, $20,000.

Penn., Pottstown—The McClintic-Marshall Co., manufacturer of structural steel and iron, is building a 400 x 600 ft. addition to its plant. Estimated cost, $2,000,000. Noted June 13.

Penn., Rutherford—The Philadelphia & Reading R. R., Reading Terminal, Philadelphia, has awarded the contract for the construction of a 1-story, 50 x 175 ft. machine shop here. Estimated cost, $50,000. Noted June 13.

Pa., Scottdale—The United States Cast Iron Pipe and Foundry Co., Morris Bldg., Philadelphia, is in the market for two 10-ton and two 5-ton cranes of 36-ft. 6-in. span, for its foundry here.

Penn., Sharpsville—The Yankee Steel Co. of America plans to build a plant near here. E. Truxall, 1014 Union Bank Bldg., Pittsburg, Pres.

Penn., Wilkes-Barre—The Sheldon Axle and Spring Co., Conyugham Ave., has awarded the contract for the construction of a 1-story, 50 x 90 ft. machine shop. Estimated cost, $12,000.

SOUTHERN STATES

Ala., Birmingham—The Ingalls Iron Works, Ave. D and 7th St., plans to build an addition to its plant. Estimated cost, $9300.

Ga., Albany—A. Garrett plans to rebuild his garage which was recently destroyed by fire. Loss, $20,000.

Ga., Atlanta—J. G. Blount, 451 Peachtree St., has awarded the contract for remodelling a 4-story, 50 x 80 ft. building into a garage; also building a 2-story, 40 x 90 ft. addition to same. Estimated cost, $15,000.

Ga., Atlanta (Kirkwood)—The Pratt Engineering and Machine Co., Hurt Bldg., is receiving bids for the construction of an addition to its foundry here.

Ky., Ashland—J. King, Arch., 39 Gaylord Bldg., is receiving bids for the construction of a 2-story, 50 x 100 ft. garage for J. H. McCleary. Estimated cost, $10,000.

Ky., Fulton—The Illinois Central R. R. Co., 135 East 11th Place, Chicago, has awarded the contract for new terminal facilities, to be erected here, to include a roundhouse, 40 x 150 ft. machine shop and boiler house, and a 25 x 120 ft. blacksmith shop. The company will require light machinery for the equipment of the machine shop. Estimated cost, $225,000. A. S. Baldwin, Ch. Engr. Noted June 13.

Ky., Louisville—The Boulier Sheet Metal Works, 912-14 South 8tn St., has awarded the contract for the construction of an addition to its plant.

Ky., Louisville—The National Process Co., 315 Guthrie St., is in the market for 3 dry vacuum pumps with 14 x 12 in. air cylinder, 2 wet vacuum pumps with 14 x 12 in. air cylinder, 2 condensate pumps 4 x 4 x 8 in. or larger, 2 Magma pumps 5 x 3 or 8 in. or larger, double effect evaporator for total heating surface 800 to 1000 sq. ft. with condenser and pumps.

La., New Orleans—The Haubtman-Loeb Co., 717 Magazine St., is in the market for a 36 in. lathe with about 18 ft. bed.

La., New Orleans—The Piedmont Motors Corporation, 1107 Commerce St., Lynchburg, Va., plans to build an automobile erecting shop here. W. A. Taylor, Pres.

La., Shreveport—W. E. Smith, Box 203, is in the market for 2 and 3 lb. sealing machinery.

N. C., Greensboro—The Southern Truck and Car Corporation, recently incorporated with $1,000,000 capital stock, has acquired a 7 acre site here and plans to build a plant, the first unit will be a 1-story, 60 x 200 ft. H. A. Christie, Secy. and Treas. R. A. Skinner, Detroit, Mich., Consulting Engr.

N. C., Marion—The Elizabeth James Knitting Mills is building a plant.

N. C., Raleigh—The State Packing Co., 202 Citizens National Bank Bldg., will soon award the contract for the construction of a packing plant. Address C. L. Brooks Engineering Co., Moultrie, Ga. Noted June 6.

N. C., Winston-Salem—Briggs, Shaffner Co. plans to rebuild its foundry which was recently destroyed by fire.

S. C., Columbia—The Tozer Engine Works, 609 Green St., is in the market for a milling machine, welding plant, boring mill and a second-hand air compressor.

S. C., Greenville—The Greenville Mattress and Manufacturing Co. plans to rebuild its plant which was recently damaged by fire.

S. C., Greenwood—The Terrell Smith Home, at Connie Maxwell Orphanage plans to rebuild its printing plant which was recently damaged by fire. A. T. Jamison, Supt.

S. C., Spartanburg—The Lummus Machinery Co., 211 Magnolia St., is in the market for equipment for a hosiery knitting mill.

Tenn., Chattanooga—The Stickney-Montague Co., recently incorporated with $500,000 capital stock, plans to establish a factory for the manufacture of machinery and machine specialties. D. P. Montague, 122 West 8th St. and C. A. Stickney, 237 East Terrace, incorporators.

Tenn., Nashville—The Southern Machine and Foundry Co., 13th and Church St., plans to rebuild its plant which was recently destroyed by fire at a loss of $2,500. Noted June 27.

Va., Portsmouth—The J. Stewart Construction Co. is building a plant at the north end of Crawford St. and will include several machine shops for the construction of bulkheads for vessels.

Va., West Union—Fire recently destroyed the plant of the Ideal Glass Co., owned by C. P. Zenor and associates, Ft. Smith, Ark. Loss, $40,000.

W. Va., Charleston—The Overland Sales Co., 1012 Virginia Ave., will build a 1-story, 53 x 140 ft. commercial garage. Estimated cost, $15,000.

W. Va., Huntington—The Banks Supply Co., 2nd Ave. and 11th St., is in the market for a hand milling machine, working surface of table about 6 x 20 in., taper hole in spindle No. 9, B and S, complete with counter shaft.

W. Va., Moundsville—The Overland Garage, 10th St., will soon start construction work on its 50 x 90 ft. addition. The company also plans to build a machine shop and install the necessary equipment. C. J. Allen and V. L. Allender, proprietors.

W. Va., Moundsville—The United States Smelting Corporation plans to build a large plant for the smelting of ore. Estimated cost, $1,000,000.

MIDDLE WEST

Ill., Amboy—The Illinois Central R. R., 135 East 11th Place, Chicago, has awarded the contract for a round house, a 40 x 150 ft. machine shop and boiler house and a 25 x 120 ft. blacksmith shop. The company will require light machinery for the equipment of the machine shop. Estimated cost, $250,000. A. S. Baldwin, Ch. Engr. Noted June 13.

Ill., Aurora—The Independent Pneumatic Tool Co. plans to improve its plant and build additions to same. Estimated cost, $15,000.

Ill., Carbondale—The Illinois Central R. R. Co., 135 East 11th Place, has awarded the contract for new terminal facilities, to include a roundhouse, a 40 x 150 ft. machine shop and boiler house and a 25 x 120 ft. blacksmith shop. The company will require light machine shop equipment. Estimated cost, $250,000. A. S. Baldwin, Ch. Engr. Noted June 13.

Ill., Chicago—The Chicago, Burlington & Quincy R. R. Co., 547 West Jackson Blvd., is in the market for an 18 in. x 7 ft. 6 in. engine lathe, 14 in. x 4 ft. 6 in. lathe, 30 in. radial drill, double-end punch and shear with a 20 in. throat to punch 1 in. hole, 20 in. heavy duty shaping machine, 1¼ in. single-head bolt cutter, draw cut high-speed power saw, 50 lb. power hammer and a combination rip and cross-cut saw with boring attachment. A. W. Newton, Ch. Engr.

Ill., Chicago—The Chicago Shipbuilding Co. has leased a 10 acre site on 100th St. and the Calumet River, South Chicago, and plans to build a shipbuilding plant.

Ill., Chicago—The Concrete-Steel Co., West Jackson Blvd., is having plans prepared for the construction of a 1-story, 225 x 350 ft. plant. Estimated cost, $70,000.

Ill., Chicago—The Groen Manufacturing Co., 2113 North Kenneth Ave., coppersmiths, has awarded the contract for the construction of a 1-story, 50 x 100 ft. factory and office building. Estimated cost, $15,000. Noted June 13.

Ill., Chicago—E. Katzinger, 122 North Peoria St., has awarded the contract for the construction of a 1-story, 74 x 75 ft. addition to his garage. Estimated cost, $20,000. Noted June 13.

Ill., Chicago—The Page Boiler Co., 815 Larabee St., has awarded the contract for the construction of a 2-story, 48 x 91 ft. addition to its factory.

Ill., Chicago—The Superior Stove Works, 832 Superior St., has awarded the contract for the construction of a 1-story, 30 x 72 ft. addition to its plant. Estimated cost, $5,000.

Ill., Cicero—The Western Electric Co., 48th and 22d St., has awarded the contract for the construction of 4 warehouses and a 6-story, 229 x 330 ft. factory for the manufacture of electrical appliances. Estimated cost, $1,000,000. Noted Apr. 25.

Ill., Des Plaines—The Benjamin Electric Co., 120 South Sangamon St., Chicago, plans to build an addition to its plant here. R. B. Benjamin, Pres. F. D. Chase, 122 South Michigan Ave., Chicago, Arch.

Ill., Granite City—The Hoyt Metal Co. plans to build additions to its plant. Estimated cost, $10,000.

Ill., Huntley—A. P. Dippold, Arch., 4747 Cottage Grove Ave., Chicago, will soon award the contract for a 1-story, 100 x 100 ft. salesroom and garage to be erected here for J. Weltzien. Estimated cost, $12,000.

Ill., Madison—The Tri-City Steel Co., 2021 Railroad Exchange, St. Louis, Mo., is having plans prepared for a 1-story, 100 x 320 ft. rolling mill and a 1-story, 32 x 100 ft. warehouse to be erected here. Estimated cost, $100,000. S. E. Camp, Pres. Noted Oct. 25.

Ill., Marion—The H. W. Clark Foundry and Manufacturing Co., North 12th St., manufacturer of water meters and pumps, plans to rebuild its plant which was destroyed by a tornado. H. W. Clark, Pres. and Gen. Mgr.

Ill., Mounds—The Illinois Central R. R. Co., 135 East 11th Place, Chicago, has awarded the contract for the construction of additions to its yard and shop. Estimated cost, $250,000. A. S. Baldwin, Ch. Engr. Noted June 13.

Ind., Indianapolis—The Oakes Manufacturing Co., Roosevelt and Wheeler St., manufacturer of auto fans and pressed steel parts, will receive bids about July 1, for a 1-story addition to its factory. Estimated cost, $50,000. Vonnegut, Bohn and Mueller, 610 Ind. Trust Bldg., Arch.

Ind., Kokomo—The Kokomo Steel and Wire Co., Citizens National Bank Bldg., plans to build a 1-story, 100 x 800 ft. factory. Estimated cost, $150,00.

Mich., Detroit—The Anderson Forge and Machine Co., c/o F. A. Hinchman, 2842 Jefferson Ave., has awarded the contract for the construction of a 1-story, 16 x 58 ft. heat treatment building.

Mich., Detroit—C. W. Brandt, Arch., 1114 Kresge Bldg., is receiving bids for the construction of a 1-story, 50 x 100 ft. foundry for the Aluminum Castings Co., 1576 Jos. Campau Ave.

Mich., Detroit—The Detroit Evening News Association, 2nd St. and La Fayette Blvd., is having plans prepared by A. Kahn, 58 La Fayette Blvd., for the construction of a garage and paper storage building. Estimated cost, $15,000. G. G. Booth, Pres.

Mich., Detroit—The Great Lakes Engineering Co., foot of Rivard St., has had plans prepared for the construction of a 56 x 109 ft. erecting shop. A. C. Pessano, Pres.

Mich., Detroit—The Power Truck and Tractor Co. has leased a factory on Beard Ave. near the Michigan Central Railroad and plans to equip same for its own use.

Mich., Detroit—The Puritan Machine Co., Lafayette Blvd. and 10th St., has had plans prepared by C. H. Crane, Arch., 2325 Dime Bank Bldg., for the construction of a 2 story, 21 x 82 ft. addition to its factory.

Mich., Detroit—The Saxon Motor Car Co., 11999 Woodward Ave., has awarded the contract for the construction of an addition to its plant. Estimated cost, $40,000.

Mich., Detroit—The Stroh Castings Co., Chene and Guoin St., has awarded the contract for the construction of an addition to its foundry. B. Stroh, Pres.

Mich., Lansing—The Old Motor Works, 1101 Division St., has awarded the contract for the construction of an addition to its plant.

Mich., Saginaw—The Saginaw Malleable Iron Co., has had plans prepared by F. D. Chase, Arch., 122 South Michigan Ave., Chicago, Ill., for the construction of a 1 story foundry. Noted June 13.

Mich., Saginaw—The Saginaw Sheet Metal Works, c/o A. J. Beese, 2060 Genesee Ave., plans to build a 1 story addition to its factory on Genesee Ave. Cowles & Mutscheller, 114 North Washington Ave., Arch.

Ohio, Akron—The Williams Foundry and Machine Co., 60 Cherry St., has awarded the contract for the construction of a 1-story, 22 x 120 ft. addition to its factory. Estimated cost, $7,900.

Ohio, Cincinnati—The Ansonia Copper and Iron Works, 1519 West 6th St., has leased a building near its works and is in the market for a hand power crane. Further metal working equipment may be required later.

Ohio, Cincinnati—The Cincinnati Steel Castings Co., 1218 Queen City Ave., has awarded the contract for the alteration of its plant. Estimated cost, $7,000. W. Gilbert, Pres. Noted May 9.

Ohio, Cincinnati—Lodge & Shipley, 3055 Colerain Ave., manufacturer of tools, has awarded the contract for the construction of its 1-story, 90 x 540 ft. factory. Estimated cost, $100,000. Noted June 27.

Ohio, Cincinnati—The Trailmobile Co., manufacturer of auto trailers, has awarded the contract for a plant to be erected on Oakley St. Estimated cost, $120,000. Noted May 30.

Ohio, Cleveland—The American Fireproof Storage Co., c/o J. Reineck, 804 Illuminating Bldg., has had plans prepared by the W. S. Ferguson Co., Arch., 615-1900 Euclid Bldg., for the construction of a 1 story, 40 x 100 ft. garage. Estimated cost, $15,000.

Ohio, Cleveland—The Cleveland Smelting and Refining Co., Leader-News Bldg., plans to build a new plant for smelting old and new metals. Estimated cost, $200,000.

Ohio, Cleveland—The P. A. Guer Co., 5100 St. Clair Ave., is having plans prepared for the construction of a 1-story, 38 x 84 ft. machine shop.

Ohio, Cleveland—The Ohio Foundry Co., East 71st and Stanton St., is in the market for a single and punch for ⅞-in. stock.

Ohio, Cleveland—The Osborn Engineering Co., Engr., 2848 Prospect Ave., is receiving bids for a 1-story, 30 x 80 ft. garage to be erected on East 71st St. for the Fishel & Marks Co., 3013 East 55th St.

Ohio, Dayton—The G. L. Best Gas Traction Co. is in the market for a 24-in. lathe, with 14-ft. bed.

Ohio, Greenville—J. H. Dunham, 223 Martin Ave., plans to build a 2 story, 87½ x 120 ft. addition to his garage. Estimated cost, $10,000. P. Pfeiffer, 726½ Bway. Ave., Arch.

Ohio, Mansfield—The Mansfield Stove Co., 150 Wayne St., has had plans prepared by E. McGeorge, Arch., Leader-News Bldg., Cleveland, for the construction of a 1-story, 80 x 400 ft. factory. Estimated cost, $50,000.

Ohio, Norwood—The Corcoran Co., 4634 Spring Grove Ave., Cincinnati, manufacturer of sheet metal products, plans to build an addition to its new plant here. M. Fischer, Arch.

Ohio, Ravenna—E. E. Morgan is building a 2 story, 56 x 90 ft. garage. Estimated cost, $10,000.

Ohio, Van Wert—The Advance Machinery Co. is in the market for a No. O Witts and Merrill key sector.

Ohio, Weirton—The Phillips Sheet and Tin Plate Co. has awarded the contract for the construction of a 600 ton blast furnace, 47 coke ovens and a large byproducts plant.

Wis., De Pere—The De Pere Manufacturing Co., manufacturers of marine boilers, has awarded the contract for the construction of 32 x 100 ft. and 100 x 100 ft. additions to its plant.

Wis., Kenosha—The Winther Motor Truck Co., Winthrop Harbor, Ill., has acquired a 10 acre site here and plans to build a plant, to include a 125 x 300 ft. main shop. The company plans to install machinery and tools in same. Estimated cost, $100,000. M. P. Winther, Pres. and Gen. Mgr.

Wis., Milwaukee—The Crown Metal Co., 871-81 Robinson Ave., has awarded the contract for the construction of a 1-story, 40 x 100 ft. foundry. Estimated cost, $3,500.

Wis., Milwaukee—The Globe Seamless Steel Tubes Co., Burnham St., will soon award the contract for the construction of two 130 x 250 ft. and 130 x 175 ft. additions to its plant at 37th and Burnham St. The company will equip same with three 10 ton electric cranes and the necessary tools. F. J. O'Brien, Mgr.

Wis., Racine—The Perfex Radiator Co., 18th St., Holmes and Flett Ave., manufacturer of automobiles, truck and tractor radiators and cooling systems, has had plans prepared for the construction of a 125 x 300 ft. plant, and plans to install practically a full equipment of new machine tools, electric motors and other machinery. E. P. Wolf, Secy. Noted June 27.

WEST OF THE MISSISSIPPI

Ark., Little Rock—The Magic Cake Flour Co., 7th and Cross St., is in the market for mixing machinery for baking powder, etc.

Colo., Denver—The Shirley Hotel Co. has awarded the contract for a 1-story, 50 x 125 ft. garage to be erected at 1645 Lincoln St. Estimated cost, $10,000. D. C. Dodge, proprietor. Noted June 20.

Iowa, Burlington—The Murray Iron Works, Central Ave. and Washington St., has awarded the contract for the construction of a 3-story, 32 x 40 ft. addition to its plant. G. G. Highbee, Pres. Noted May 30.

Ia., West Liberty—C. Burkhart will soon start the construction work on his 1-story, 25 x 88 ft. garage and machine shop. Estimated cost, $12,000.

Minn., Duluth—The Clyde Iron Works, 29th Ave. and Michigan St., has awarded the contract for a 2-story, 74 x 80 ft. addition to its machine shop. Estimated cost, $21,500. Noted June 6.

Minn., Minneapolis—The Gas Traction Foundry Co., c/o D. A. Potter, 2907 Southeast 4th St., has awarded the contract for the construction of a 1-story, 40 x 300 ft. addition to its foundry. Estimated cost, $25,000.

Mo., St. Louis—J. H. Dierkes, c/o N. Wedemeyer, Arch., 825 Wainwright Bldg., has awarded the contract for the construction of his 73 x 130 ft. garage. Estimated cost, $10,000.

Neb., Lincoln—S. Colignio, 146 North 10th St., is building a 2-story, 60 x 126 ft. garage. Estimated cost, $30,000.

Neb., Omaha—The Nebraska Buick Auto Co., 1912-16 Farnum St., has awarded the contract for a 4-story, 88 x 136 ft. garage and salesroom to be erected at 1901 Howard St. Estimated cost, $150,000.

Okla., Durant—The Durant Grain and Elevator Co. is in the market for machinery with which to equip an elevator of a 150,000 bu. capacity and a mill of a 500 bbl. daily capacity.

Okla., Durham—The Durham Milling Co. is in the market for drilling machinery. Estimated cost, $20,000. Address A. R. or C. H. Hacker.

Okla., Enid—M. C. Garber, 2nd St. and East Bway., has awarded the contract for the construction of a 2-story, 50 x 150 ft. garage. Estimated cost, excluding the machinery, $20,000. Noted May 9.

Okla., Oklahoma—The Midland Motor Car and Truck Co., 519 Mercantile Bldg., plans to install machinery for the manufacture of battle airplanes.

Tex., Bay City—The Gulf Sulphur Co. is in the market for machinery including boilers and other steam equipment with which to operate sulphur wells.

Tex., San Angelo—Casseb Bros. plan to build a garage. Estimated cost, $10,000.

Tex., Sierra Blanca—The Quitman Mining and Milling Co. plans to build an ore concentrating plant.

WESTERN STATES

Calif., Alameda—The Union Iron Works Division of the Bethlehem Shipbuilding Corporation, 2308 Webster Ave., San Francisco, is building its new 10 ways shipyard here. Estimated cost, between $15,000,000 and $20,000,000. J. J. Tynan, Gen. Mgr. Noted June 27.

Calif., Fillmore—The Union High School is in the market for manual training equipment with which to equip its proposed work shop addition.

Calif., Los Angeles—The Adams Pipe Works, 2023 Bay St., has awarded the contract for the construction of a 1-story, 90 x 173 ft. factory. Estimated cost $14,000.

Calif., Oakland—The Union Construction Co., 604 Mission St., San Francisco, is receiving bids for furnishing machinery and equipment for its new shipbuilding plant here.

Ore., North Bend—L. J. Simpson and others plan to establish a shipbuilding plant. Estimated cost, $500,000.

Ore., Portland—The Supple-Ballin Shipbuilding Corporation is building an outfitting dock between East Morrison and East Taylor St. from Water St. to the river, with accommodations for 10 hulls. Estimated cost $200,000.

Wash., Seattle—The Skinner & Eddy Co., 1559 South Railroad St., is having plans prepared by A. C. P. Willatzen, Arch., Boston Bldg., for a 2-story addition to its shipbuilding plant.

Wash., Vancouver—The American Can Co. will receive bids within 90 days for the construction of a 4-story factory.

METAL

CANADA

B. C., Queensborough—The Lumber Products, Ltd., Brunette St., New Westminster, has acquired a 5 acre site and the factory of a Defunct Nail Co. here and plans to install equipment in same for the manufacture of lumber products. Estimated cost, $60,000.

N. B., St. John—T. McAvity & Sons, Ltd., 13 King St., manufacturer of hardware, has awarded the constract for the construction of an addition to its steel plant. Estimated cost, $500,000. Noted May 16.

N. B., St. John—The St. John Dry Dock and Shipbuilding Co. will start construction work at once on its dry dock and shipbuilding plant. Estimated cost $7,000,000.

N. S., New Glasgow—The McNeil Shipbuilding Co. is in the market for equipment for its shipbuilding plant to include machinery for beveling wood. Address C. McNeil, c/o the company.

N. S., Sydney—The Dominion Iron and Steel Co. is building a 121 x 1200 ft. plate mill. Noted Feb. 21.

Ont., Georgetown—H. Corks & Co. is in the market for engine lathes, etc.

Ont., Hamilton—The Canada Iron Foundries, Ltd., Stuart St., W., plans to rebuild its engine room, pattern and moulding shops, which was recently damaged by fire at a loss of $40,000.

Ont., Hamilton—The Dominion Steel Foundry Co., Depew St., has had plans prepared for the construction of a plant. Estimated cost, $2,500,000.

Ont., St. Thomas—The Lawson & Jones Printing and Lithographing Co., Clarence St., London, has purchased a building here and plans to install machinery in same. Estimated cost, $55,000. R. Lawson, Mgr.

Ont., Toronto—The Davenport Investments, Ltd., plans to build a 1 story addition to its machine shop on 688 Dufferin St. Estimated cost, $11,000.

Ont., Toronto—The Dominion Wheel and Foundry Co., 131 Eastern Ave., plans to build an addition to its foundry. Estimated cost, $5000.

Ont., Toronto—The J. Kaiser Spring Bed Co., 570 Richmond St., W., plans to rebuild its factory which was recently destroyed by fire.

Ont., Toronto—The Sheet Metal Products Co. plans to build a 2-story addition to its factory on Gerrard St. Estimated cost, $6000.

Ont., Walkerville—The Canadian Hoskins Co., manufacturer of electric furnaces, has had plans prepared by A. Kahn and E. Wilby, Arch., Marquette Bldg., Detroit, Mich., for the construction of a 1-story, 60 x 200 ft. factory and foundry. Estimated cost, $30,000.

GENERAL MANUFACTURING

NEW ENGLAND STATES

Mass., East Cambridge—The American Rubber Co. has awarded the contract for the construction of a 4-story, 50 x 60 ft. addition to its factory. Estimated cost, $45,000.

Mass., East Longmeadow—H. G. Fisk, 111 Myrtle St., Springfield, plans to build a 1-story, 20 x 30 ft. creamery here. M. H. Westhoff, 293 Bridge St., Springfield, Arch.

Mass., New Bedford—The Nashawena Mill Corporation, Belleville Ave., has had plans prepared by C. R. Makepeace & Co., Engrs., 430 Butler Exchange Bldg., Providence, R. I., for teh construction of a 2-story, 155 x 264 ft. addition to its weave shed and a 3-story, 112 x 136 ft. addition to its spinning mill. Estimated cost, $400,000. Noted May 30.

Mass., Newtonville—The Silver Lake Co. Nevada St., manufacturer of braided cordage, is building a 2-story, 50 x 100 ft. addition to its factory. Estimated cost, $25,000.

Mass., Stoughton—The Perfection Cooler Co. will soon award the contract for the construction of a 3-story, 58 x 108 ft. factory. W. P. Hatch, 60 State St., Boston, Arch.

MIDDLE ATLANTIC STATES

Md., Baltimore—The Baltimore Manufacturing Co., Monument and Constitution St., manufacturer of yeast, has awarded the contract for five 1, 2 and 3 story factories, to be erected on Central Ave. and Bank St. Estimated cost, $110,000.

N. J., Newark—Kaufherr & Siegel, 200 Magazine St., manufacturers of leather, will soon start construction work on its 3-story, 40 x 100 ft. factory to be erected at 114-116 Amsterdam St. Estimated cost, $20,000.

N. Y., New York—(Borough of Brooklyn)—Kirkman Sons, manufacturers of soap, have had plans prepared by W. J. Van Nostrand, Arch., Bridge and Wall St., New York City, for the construction of an addition to its factory on Bridge St. north of Water St. Estimated cost $3000.

N. Y., New York—(Borough of Brooklyn)—The Parker Stearns Co., 288 Sheffield Ave., manufacturer of rubber goods, has had plans prepared by U. Infanger, Arch., 2634 Atlantic Ave., for the construction of an addition to its factory on Belmont and George Ave. Estimated cost, $12,000. J. Parker, Pres.

N. Y., Red House—The A. B. Smith Co., White Bldg., Buffalo, will soon receive bids for its 2-story, 100 x 250 ft. chemical plant to be erected here. Estimated cost, $35,000.

N. Y., Utica—The Globe Woolen Mills, 819 Court St., has awarded the contract for the construction of a 50 x 59 x 266 ft. addition to its plant. Noted June 13.

Penn., Emporium—Fire recently destroyed the tannery of the Elk Tanning Co. Loss, $500,000.

Penn., Ferndale—Fire recently destroyed the glazing works of the Du Pont Hercules Powder Co. Loss, $10,000.

Penn., Philadelphia—The Barrett Manufacturing Co., Margaret and Bermuda Sts., manufacturer of coal tar products, has awarded the contract for the construction of a 1-story, 60 x 65 ft. addition to its factory. Estimated cost, $15,000.

Penn., Philadelphia—The Linde Air Products Co., 18th and Cambria St., has awarded the contract for the construction of a 1-story addition to its factory.

SOUTHERN STATES

Ala., Montgomery—The Dixie Cotton Oil Co., Bell and Wash F. Rd., plans to rebuild its plant which was recently destroyed by fire at a loss of $50,000. Noted June 27.

Ala., Opelika—The Opelika Heading Co., recently incorporated with $12,000 capital stock, has leased a 100 x 100 ft. factory and plans to install machinery and equipment for barrel and keg heading. Estimated cost, $14,000.

Fla., Tampa—Marceline Perez & Co. 12 Duane St., New York City, plans to establish a factory here for the manufacture of hand made Havana cigars.

Ga., Albany—The Anton Huber Lumber Co., Moultrie, has acquired a factory here and plans to remodel same for its own use.

Ga., Griffin—The Georgia Cotton Mills plans to build an addition to its plant and equip same for bleaching and spinning.

Ky., Lexington—The University of Kentucky will soon award the contract for building a 40 x 267 ft. woodworking and automobile shop.

Ky., Lockland—J. B. Speed & Co., Speed Bldg., Louisville, plans to build a potash plant here. Estimated cost, $100,000.

Ky., Shelbiana—Rodgers Bros. Lumber Co. has purchased timber boundary on Shelby Creek and plans to develop same and build a sawmill.

Tenn., Coal Creek—The Magnet Knitting Mills, Clinton, plans to build a 60 x 200 ft. hosiery mill here and install 150 knitting machines in same. Estimated cost, including equipment, $70,000. Manley & Young, Holston Bank Bldg., Knoxville, Archs.

W. Va., Clarksburg—The National Carbon Co., 11700 Madison Ave., Cleveland, has awarded the contract for the construction of a factory here. Estimated cost, $150,000.

MIDDLE WEST

Ill., Chicago—The Industrial Building Co., Engr. and Contr., 38 South Dearborn St., has been awarded the contract for an oil distributing station, to include a 30 x 170 ft. garage and machine shop, to be erected on 35th and Western Ave. Estimated cost, $150,000. Owner's name withheld.

Ill., Chicago—L. Pfaelzer & Son, 3927 South Halsted St., has awarded the contract for the construction of a 2-story, 51 x 109 ft. packing plant.

Ill., Chicago Heights—The Victor Chemical Co., 343 South Dearborn St., has awarded the contract for the construction of a 2-story, 60 x 212 ft. factory. Estimated cost, $25,000.

Ill., East St. Louis—The Montsano Chemical Co., 1800 North 2d St., manufacturer of coal tar products, will build a plant. Estimated cost, $1,000,000. Bronneke & Fay, 1204 Fullerton Bldg., Engrs. Noted Sept. 27.

Ill., East St. Louis—Fire recently destroyed the plant of the Pure Carbonic Co., 808 Walnut St.

Ill., East St. Louis—Fire recently destroyed the plant of the Sternkopf Planing Mills.

Ill., Elgin—The Western Thread Co., Grace and Bluff St., has awarded the contract for the construction of a 1-story, 56 x 58 ft. addition to its factory. Estimated cost, $6000. J. C. Mutter, Supt.

Ill., Rockford—J. E. Boyington and H. C. Benson plan to build a factory on Fremont St. for the manufacture of pipe organs.

Ill., Waukegan—A. A. Angell, c/o Gross Pfleger Tanning Co., is receiving bids for the construction of a 3-story, 125 x 175 ft. hide house and power plant.

Mich., Detroit—The American By-Products and Chemical Co., c/o A. F. Young, 1215 Woodward Ave., has awarded the contract for the construction of a factory. Estimated cost, $15,000.

Mich., Detroit—The C. R. Wilson Body Co., Clay Ave. and the Grand Trunk Railway, manufacturer of automobile bodies, has awarded the contract for the construction of a 2-story, 30 x 120 ft. factory. Estimated cost, $250,000. Noted June 13.

Mich., Highland Park—The Tower Creamery Co., Detroit, has awarded the contract for an addition to its creamery here. Estimated cost $2500.

Ohio, Cleveland—The National Woolen Co., 3131 West 33d St., has awarded the contract for a 2-story, 70 x 131 ft. addition to its factory. Estimated cost, $12,000. H. G. Slatmyer & Son, Arch.

Ohio, Toledo—The Bureau of Docks and Yards, Navy Department, Wash., D. C., has awarded the contract for the construction of a nitrate plant here. Estimated cost, $20,000,000. C. W. Parks, Ch.

Wis., Milwaukee—Fire recently damaged the factory of the Standard Glove Co., 1213 Lee St. Loss, $25,000.

WEST OF THE MISSISSIPPI

Ark., Paragould—The Echardt-Lennon Cooperage Co. plans to rebuild its plant which was recently damaged by fire at a loss of $800.

Ia., Dubuque—The Farley-Loetscher Manufacturing Co., 7th and White St., plans to install new machinery in its plant for the manufacture of munition cases for the Government.

Ia., Ft. Madison—The Curtis Bros. Handle Co. will soon award the contract for a 2-story, 129 x 401 ft. factory to be erected in the Factoria district. Noted May 23.

Ia., Sioux City—The Midland Packing Co. is building a large packing plant on Leech Ave. and Prospect St. Estimated cost, $1,000,000. Noted June 13.

Minn., St. Paul—The Casey Pure Milk Co., 203 South Franklin St., has awarded the contract for a 1-story, 60 x 60 ft. creamery to be erected on 3d St., between Maria and Mounds Blvd. Estimated cost, $12,000.

Mo., Kansas City—The Jensen-Salsbery Laboratories, manufacturer of serums and medicines, has purchased a 100 x 128 ft. site on West Pennway and Pennsylvania Ave. and plans to build a 3-story factory. Estimated cost, $100,000. E. O. Brostrom, Arch.

Mo., St. Louis—L. Haeger, Arch., 3844 Utah St., will soon award the contract for a 2-story, 180 x 200 ft. factory to be erected on Gravais Rd. for the Alligator Oil Clothing Co., 1118 South Grand Ave., manufacturer of water proof clothing. Estimated cost, $125,000.

Okla, Poteau—The Poteau Window and Dry Plate Glass Co. plans to build four 140 x 200 ft., 125 x 174 ft., 50 x 100 ft. and 30 x 80 ft. buildings and will install machinery in same to manufacture glass for windows and photographic dry plates. Estimated cost, $100,000.

S. D., Huron—The Farmers Co-operative Packing Co. is having plans prepared by the Packers Architect and Engineering Co., Arch., 431 South Dearborn St., Chicago, for the construction of a packing plant, consisting of a 4-story 90 x 235 ft. main building and a 65 x 90 ft. boiler house. Estimated cost, $500,000.

Tex., Bryan—R. M. Mauding, Greenville, N. C., plans to organize a company and establish a large cotton mill here.

Tex., Ft. Worth—The Southland Tire and Rubber Co., 303 Brady Bldg., San Antonio, manufacturer of automobile casings, tubes and other rubber goods, has had plans prepared for the ocnstruction of a 3-story, 80 x 300 ft. factory, etc. Noted Apr. 25.

Tex., Ranger—Clements & Leveridge plan to build an oil refinery about 3 miles east of here.

Tex., Ranger—Crowett & Gant, Ardmore, Okla., has purchased a site near here and plan to build an oil refinery.

Tex., Snyder—The Snyder-Oklahoma Oil and Refining Co. plans to build an oil refinery here.

WESTERN STATES

Ariz., Chandler—B. B. McCall and others plan to establish a cotton gin.

Calif., Cucamonga—J. B. Lafourcade is having plans prepared by A. R. Walker and A. L. Acker, Arch., for the construction of a 1-story, 82 x 160 ft. packing plant.

Calif., Fresno—The Griffin Skelley Co. has awarded the contract for the construction of an additio nto its packing plant on the Southern Pacific Reservation at Santa Clara St. Estimated cost, $10,000.

Calif., Riverdale—The Riverdale Co-operative Creamery plans to build an addition to its creamery. Estimated cost, $15,000.

Calif., San Diego—W. M. MacNichol has leased a site at the foot of Juniper St. and plans to build a fish cannery. Estimated cost, including equipment, $30,000.

Calif., San Pedro—Nielsen Kittle Canning Co., Ltd., has secured a site and plans to build a cannery.

Calif., Whittier—The Olivedale Packing Association has awarded the contract for the construction of a 1-story, 80 x 157 ft. packing plant. Estimated cost, $22,000.

Ore., Portland—The Goodrich Tire and Rubber Co., 15 North Bway, has awarded the contract for the construction of a 1-story addition to its factory.

Wash., Seattle—The Currin & Greene Manufacturing Co., 225 Eastlake St., manufacturer of shoes, will soon award the contract for the construction of its factory. Estimated cost, $30,000.

Wash., Seattle—The Kerr & Green Shoe Co. plans to build a factory. Estimated cost, $20,000.

CANADA

B. C., Burnaby—Pearson & Co. plans to rebuild its shingle mills, which was recently destroyed by a fire at a loss of $60,000. The company plans to purchase and install new machinery in same.

B. C., Lulu Island—The British Columbia Manufacturing Co. plans to build a sawmill and box factory here. Estimated cost, $20,000. J. H. McDonald, Mgr.

N. B., Forest Glen—S. H. White & Co., Sussex, plans to rebuild its sawmill which was recently destroyed by fire at a loss of $30,000. The company will install new machinery in same.

Ont., Alvinston—The Alvinston Flax Mills Co. is having plans prepared for the construction of a new factory, and plans to install new machinery for the equipment of same. Estimated cost, $50,000. G. G. Bramhill, Mgr.

Ont., Ingersoll—The Ingersoll Packing Co. plans to build an addition to its plant. Estimated cost, $25,000. Watt & Blackwell, Bank of Toronto Bldg., London, Arch.

Ont., Thorold—Fire recently damaged the plant of the Ontario Paper Co. Loss, $30,000.

Ont., Toronto—The Empire Mattress Co., 570 Richmond St., W., plans to rebuild its factory which was recently destroyed by fire.

Que., Quebec—Fire recently damaged the shoe factory of L. Beaubien, 617 St. Valier St. Loss, $25,000